THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS
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THE RELATION OF METAL CAST TO FLOOR AREA OF FACTORY

A Reply to the Question of How Many Pounds of Brass Should be Produced Per Square Foot of Floor Space Occupied.

By P. W. Blair.*

The following question has been given to me to answer: What is the average weight of brass cast per day and per square foot of floor area in some of the up-to-date brass foundries, this to include the space devoted to molding, furnaces, grinding, chipping and filing?

In the Mueller Manufacturing Company's foundry, one of the most up-to-date plants in the country, equipped with the latest improved appliances for the production of high-grade goods in their line, there is an average of 15 to 16 tons of red brass metal melted and poured into molds per day. Their floor space for furnaces and molding only covers 350 square feet, and the entire space is occupied. They produce on an average 2,500 to 2,800 molds per day, and the capacity is 3,250 per day. They use the entire product for their own use; no jobbing or outside castings are made. They have fifteen molders working on the bench and sixteen on machines, one and sometimes two working on the tub on loose work. Fifty to sixty molds is a day's work on the bench, but it depends to a great extent on what class of work they are working on. All molds put up over and above that amount are paid for on a bonus system. They average 75 to 100 molds per day.

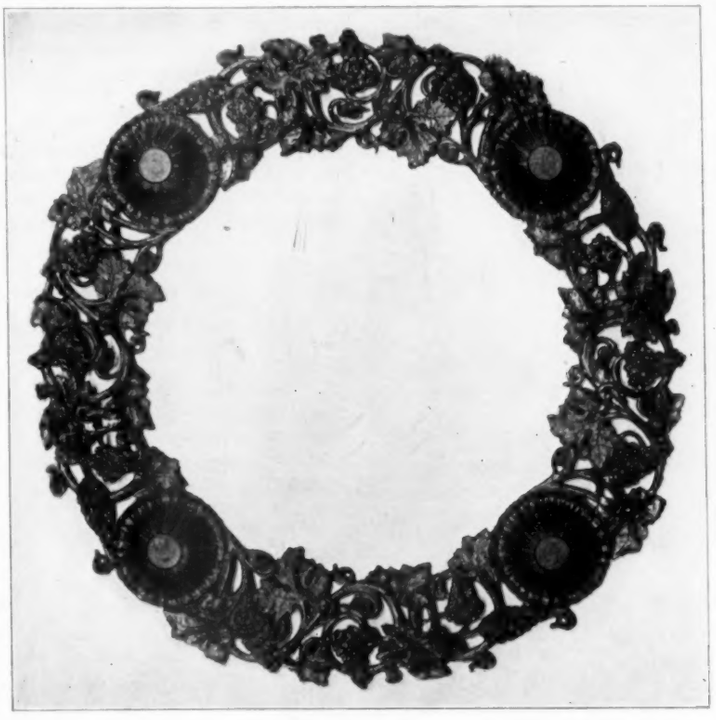


FIG. 1. A CHANDELIER CASTING MADE IN ONE PIECE BY THE FARIES MANUFACTURING COMPANY, DECATUR, ILL. THIS CASTING WAS FORMERLY MADE UP OF FOUR SEPARATE PARTS.

The machine molders have to put up 100 to 110 molds for a day's work, and all over that amount are paid for on a bonus system. They put up 125 to 175 per day. They all set their own cores and pour their own molds. For a while they tried core setters and regular men for pouring off, but this was not satisfactory. All sand is riddled and molds shaken out by helpers. The wages paid to molders run from 25 cents to 40 cents per hour, and the average bonus paid every month amounts to $20 per molder. They employ from 65 to 68 molders, furnace tenders and helpers. The average cost of brass castings, molding, melting and labor, is 21 cents per pound.

The grinding, chipping, filing and rattling department is run separately in another department from the foundry and occupies a floor space of 2,500 square feet. All castings are sent from there to the casting storage ready to be delivered to the shops. Castings are cut from the gates, ground, filed, chipped, rattled, counted and weighed. The average weight of good castings delivered per day is eight tons to casting storage. The wages paid are from 18 cents to 28 cents per hour, no bonus system being employed.

The sand and metals are stored in separate buildings adjoining, also a crusher and separator. The plates of patterns on bodies of valves, basin cocks, bibbs and water cocks run from two patterns on a plate to 24 on a plate on the small sizes. Basin cocks with spout cast in body run from 6 to 8 patterns on a plate. On some of the small work on parts of bodies there are as many as 150 patterns on the plate. The space occupied for molding and melting furnaces, 9,600 square feet.

I will now give you a very interesting report from a foundry manufacturing chandelier brass castings. I had

*Foreman of Brass Finishing Department of H. Mueller Manufacturing Company, Decatur, Ill.

the pleasure of taking the question up with Mr. Morenz, superintendent of foundry of the Faries Manufacturing Company, Decatur, Ill., manufacturers of chandelier gas and electric light fixtures. I personally visited their plant and saw some of the best ornamental brass castings of all kinds of designs and sizes. They make a specialty of chandelier and soda fountain fixtures and ship them to all parts of the United States and Canada. There are a number of chandelier manufacturers who send their most intricate and ornamental patterns to the above firm, as they find it to be more profitable than casting same in their own foundry.

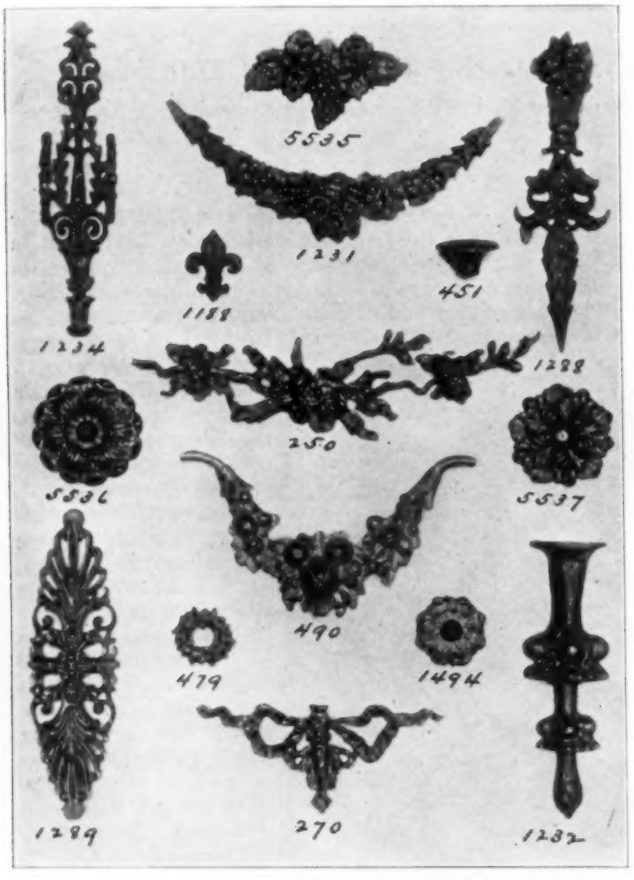


FIG. 2. SOME ARTISTIC BRASS CASTINGS MADE BY SCIENTIFIC MANAGEMENT AT THE PLANT OF THE FARIES MANUFACTURING COMPANY, DECATUR, ILL.

Fig. 1. This pattern is made for a chandelier manufacturing company in Buffalo, N. Y., and previous to being molded in this shop it was cast in four different connections or parts. The cost alone of brazing was one dollar and fifty-five cents. The entire casting is now made for two dollars and twenty-five cents. All the castings used on the soda fountains are made from German silver and are furnished to the Walrus Soda Fountain Company and the Decatur Fountain Company, two of the largest soda fountain manufacturers in the country. They have separate and distinct patterns and designs.

The equipment in this foundry is right up to date on the class of work that is produced. The average pounds of brass cast per day, per square foot of floor area, this to include the space devoted to furnaces, molding, grinding and chipping, is one-half pound. The average cost of chandelier castings per pound, this to include molding, grinding, chipping and filing, is at present 25⅛ cents.

There are fifteen molders employed at the bench and floor on large work, and the majority of the work is loose pattern and plate work; the average is thirty-five molds per day. There are three molding machines in constant operation getting out 75 to 100 molds per day. The molders have helpers for shaking out their molds and riddling their sand. All work is poured on the flat. Metals are melted by oil in the old style coke furnaces, which were converted into oil burners, and they can be used for coke at any time. They expect to have to go back to coke shortly, as they are unable to secure any oil at present, owing to the demand and the price advancing so alarmingly.

There are 300 square feet of space occupied by the molding, grinding, filing, chipping and furnaces. They melt 1,600 pounds of metal per day; 800 pounds of it for chandelier work alone, and the balance is used on job casting, soda fountain fixtures and aluminum castings. The floor space is not all occupied, but is being taken up gradually as the business increases.

The company are large consumers of hexagon and round brass rod in the manufacturing end of their business, and all the rods are cast in iron molds in pits 12 x 6 feet and 10 feet deep, equipped with an air hoist for elevating the iron molds out and in. The bars and rods are cast in 10 feet lengths, the molds standing up on end right around the edge of the pit. They are cast one-eighth inch over the desired size and then placed on a draw bench and drawn through a die to the required size. The iron molds are brushed out with a brush saturated with lard oil and then clamped and returned to the pit to be refilled.

There were rough castings in brass and aluminum ready for shipment to Los Angeles, Cal.; Buffalo, N. Y.; Toronto, Can., and Vancouver, B. C.; so from the above you can form an estimate of the business they do on light chandelier and ornamental fixtures.

THE COPPER INDUSTRY IN TURKEY.

[UNITED STATES CONSUL ALFRED S. NORTHRUP, TREBIZOND.]

Copper is a very important factor in the housekeeping of Turkey. Not only are almost all the kitchen utensils made of copper, but also big caldrons to heat water for washing, copper bowls in which to wash clothes, large pans in which to knead dough, pitchers and wash-bowls for toilet purposes, jars in which to carry and keep water, chafing dishes for use with charcoal fires, lunch boxes (several dishes fastened together), pails, teapots, coffeepots, plates and platters for food, and even drinking cups are copper. Copper trays of all sizes and shapes, some circular in form, from 3 to 4 feet in diameter, are used for sending sweetmeats to the bakery, and also—when put on a stool—serve as tables around which the whole family, sitting on the floor, partake of the food served in a copper dish in the middle. Copper utensils constitute a form of savings banks among the poorer classes. What money they can spare is invested in copper utensils as an addition to their stock, and when they are in need of money they sell what can be spared of their copper, according to their needs.

The working of copper forms a special trade in Turkey and coppersmiths have their own quarters in every Turkish market. These are little shops, in each of which a master brazier and three or four apprentices pound copper into the required shapes. The only tools they use are an anvil and a hammer, the size of which depends on the kind of work to be done; there is no forge, no fire and no machinery.

MORE TALK ON THE USE OF LACQUER

By Frank P. Davis.*

Often specific directions may be given for the use of lacquer and yet the user may lose the main point through failure to grasp it. I have in mind a case that will illustrate this nicely. The work was small brass polished ferrules and the amount about two thousand gross a day. A good job was required. The lacquer was a cotton combination, carrying a good proportion of gum. The directions were to use 140 degs. F. heat for half an hour. There seemed to be no wearing qualities to the lacquer on the samples of finished work, it marred easily and was not hard. Usually when the directions were adhered to the results were perfect. The lacquer being one used for years by large and exacting users, yet in this case results were not right and the users, who were intelligent, insisted they were carrying out instructions. Investigation showed that they were, as they understood them. The work was hung in frames that had a surface probably equal in area to the work they carried. The frames had many coats of lacquer, through infrequent cleaning, which soaked up much solvent each time they were used. The ovens were large and held many frames of work and were *poorly ventilated. A thermometer in the door* showed the temperature inside. When the temperature showd 140 degs. F. for a half hour the work was removed. When the doors were thrown open the out rush of volatile gas would strangle one. It made little difference what the temperature was or how long they remained there. The point is the lacquer could not harden as long as the gas made by the volatile part of the lacquer remained.

Lacquered work that is thoroughly dry in an oven will be softened up again if a lot of newly lacquered work is put in with it. It is these little things that cause the frequent and perplexing annoyances that occur. It is all a matter of common sense, which by the way is often rather uncommon. Oil often plays the mischief with lacquer. Besides causing brown streaks in dipped work, as spoken of in my talk in the October number, it is bad on brush-lacquered work, and it takes mighty little of it to cause trouble. Oil is one of the thinnest things in the world and science has proven that it may be thinned out to a thickness of a millionth of an inch! It sounds ridiculous till the proof is submitted. Allow that a drop of oil measures one-tenth of an inch each way, if it were square, which is reasonable. If this drop of oil was placed on water and spread over one square inch of surface it would be only a thousandth of an inch thick, for there are one hundred tenths of an inch in that space. Every plater knows by experience that a drop of oil will spread over several feet of surface on his water tanks, and he also knows that he must remove it before he pulls his cleaned work to be plated up through it. Now if the drop of oil spreads over a foot of surface it will be only 144,000th of an inch thick, and if it spreads over 7 ft. of water it will be only a millionth of an inch thick at any part.

A heavy gum or combination lacquer would absorb a very thin film of oil and stick in spite of it, but a flat or silver lacquer would not hold well over it, nor would either hold its color. Buffed work that is impractical to clean by washing, like chandelier parts, must be dry buffed last of all. It is good practice to wipe off such work with lacquer thinner. For the very best work that is to hold its color and last perfect cleanliness must be obtained. There are no two ways about this. Many a chandelier display that has hung long will show hair line streaks of black oxidized surface. This may be caused by the brush "splitting" as the lacquer is applied, and the best workmen cross brush their work, which will effectually obviate this. It is my opinion, however, that carelessness in mixing the lacquer causes most of it. The workman pours some lacquer into a cup and then some thinner, gives it a stir or two and proceeds to apply it. The result is the lacquer in streaks is pretty much all thinner.

If one will carelessly mix up some lacquer and thinner in a glass cup and look through it towards a strong light it will appear like heat waves, showing the imperfect mixture. It is well to mix up a reasonable quantity by shaking it up in a small can. Dip lacquers are best thinned at night, which will allow time to thoroughly blend. Occasionally on large plain work small brown spots will appear. Lacquer may be dried to seem ready for assemblying, yet be soft next to the metal, especially so where extra heavy coats are used. Now this hard shell of lacquer over a cushion of soft lacquer next the metal will break or slip off if knocked about before drying is complete. If packed in this condition the pulling of a cord may be sufficient to do it. The remedy is more protracted drying. Frequently extra heavy lacquering is necessary on fine work, but a perfectly flat finish is desired. This may be obtained by rubbing the surface with dry fine pumice stone. A cloth will do on plain surfaces, but a medium soft brush is best on figured work. This method is especially effective on pigment lacquers or lacquer enamels where one desires to use a clear lacquer over them.

*Celluloid Zapon Company, New York.

AMERICAN INDIAN MEMORIAL.

In the presence of thirty-three full-blooded Indian chiefs, most of them in the full panoply of their rank, President Taft at Fort Wadsworth, on February 22, broke ground for the magnificent National American Memorial which will stand 165 feet above the water on the Staten Island shore of the Narrows. The ceremony was attended by scores of gold-bedecked officers of the Army and Navy and a great concourse of distinguished men and women, as well as by artillerymen, marines and sailors.

The great monument which is to be erected is intended to typify the nobility and past greatness of the American Indian. Its erection was authorized by the Sixty-second Congress and Rodman Wanamaker was appointed head of the committee named to build it. Its base will be of granite and marble, while the structure will be topped by the colossal figure of an Indian in bronze. It will occupy the highest point on the coast between New York and Florida, and will give the first greeting of America to the travelers entering New York Harbor.

It will be noted from the above that the memorial to the American Indian, as it will finally be erected, differs in considerable respects from its first proposed form as described in The Metal Industry, January, 1910. The monument as at first designed consisted of an enormous shaft or column of bronze bearing the bronze Indian statue on its summit. At the base was an elaborate building intended for a "Peace" hall, hence the first announced name of Peace and Indian Memorial Monument.

PEWTER WARE

An Interesting History of a Useful Metal That Is Now Only a Curiosity.

By R. I. Geare. *

A study of the history of pewter discloses the fact that in the early years of its manufacture the most skilled workmen were carefully protected by legal enactments. In England, in 1348, for instance, ordinances were granted by the Mayor of London permitting the use of only two qualities of pewter: "finite," which contained as much brass as the tin "of its own nature will take," and a composite material made of tin with about 20 per cent. of lead. It was this kind which was used for pewter plate. Occasionally, however, other metals than lead were mixed with tin to produce pewter, such as zinc, bismuth, copper and antimony. Again, no pewter goods could be brought into London till they had been assayed. Even the weight for the better quality of pewter objects was fixed by law, and in 1503 an act of Parliament was passed prohibiting the sale of pewter off the premises of a pewterer except in open market, and every piece had to bear the maker's mark. No foreign artisan was allowed to work in pewter in England, nor could the English pewterers work outside of England under pain of alienation.

A PEWTER SALVER, EMBOSSED WITH MEDALLIONS CONTAINING ALLEGORICAL PERSONAGES, REPRESENTING THE FOUR ELEMENTS AND THE SCIENCES. "TEMPERANTIA," A SEATED FIGURE, ON A RAISED MEDALLION IN THE CENTER. BY F. BRIOT, FIFTEENTH CENTURY.

Thus the production of artistic objects made by hand was encouraged to the detriment of the cheaper class of machine produced articles. It may be that a plain vessel for kitchen use might as well be made in the cheapest way, but in earlier days that was not sufficient. Decoration molded by human intelligence, instead of being merely impressed by machinery, was in demand, and, let us hope, always will be. How much more pleasing is the article which bears the stamp of humanity than the one which, however costly the materials used, is fashioned only through the agency of a machine!

Pewter-ware may some day be revived in all its former beauty, and from the present outlook such a revival does not seem impossible. In England societies have recently been organized to encourage the production of artistic objects of hand-work, and pewter is being recognized again as an excellent material for the purpose. The disuse of pewter, for the time at any rate, was due doubtless to the introduction of cheap pottery and glass, the discovery of more silvery and harder alloys, such as Brittania metal, German and nickel silver, zinc, block tin, Japanned iron, and other composites.

It is interesting to note briefly the extent and various uses for which pewter was employed. In the old days it was hammered, spun, or cast. The molds were of brass or gun-metal, very carefully fitted and massive. The metal was poured directly into them, as with lead and zinc; and if hollow castings were required, as in the case of handles for tankards, the mold was reversed before the metal became chilled through. What was still molten ran out, leaving a cavity in the interior of the casting, as in the French art zinc work. The surface of the casting needed to be turned on a hand lathe and burnished if it was required to be left plain and bright. Otherwise, nothing further was necessary, although the castings were usually hammered over, to improve their general appearance and to toughen the metal. Spun, hammered and embossed pewter is no longer produced except in the quality of Brittania metal.

Pewter was extensively used for church vessels. There is a record of a canopy, made entirely of pewter, over the figure of a saint in St. Vincent's church on the Garonne, and Gregory of Tours mentions a basilica roofed with pewter. It was also used in the construction of organ pipes, and a record of the 15th century shows that 14,500 pounds of it were used on a single occasion for that purpose.

One of the most eminent workmen in pewter was a Frenchman named Briot, who flourished in the middle of the 16th century. Several of his pieces became historic, such as the salver representing in relief the History of Susanna and the Elders. His best piece of work is supposed to have been a ewer and dish, representing Charity and Temperance. One of his finest salvers accompanies an illustration of this article. In France the working of pewter as an art-craft dates back to the time when Jules Bratteau and others commenced the production of the most beautiful plaques of pewter for cabinet work and bas-reliefs, as well as coffee sets, canisters, flagons, etc. In Germany pewter work was often engraved and was also

*National Museum, Washington, D. C.

sometimes etched with the effect of "niello," which consisted of putting the design in the metal and afterwards filling the incised places with some black alloy.

In his "Dictionary of Art," Howard has reproduced several lists of pewter objects possessed by men of wealth in olden times. Thus, in 1389, the Bishop of Rheims bequeathed "18 dishes, great and small, 48 porringers, a

A pewter tankard with brass top and lion feet, the lid surmounted by a lion rampant holding a shield, engraved with arms. In front is an escutcheon, stating the tankard to be the property of an United Guild of Millers and Bakers. Dated 1695. Height, 2 feet, and 2½ inches in diameter at the bottom.

square measure, 2 small quart pitchers, 2 round silver fashion, 1 square pint, 2 measures of 3 chopines silver fashion," etc., etc. Another entry records that the Archbishop of Canterbury in 1575 owned "18 score and ten pounds of pewter vessels in the kitchen, in jugs, basins, porringers, sauce-boats, pots, and 19 candlesticks; also pewter measures in the wine cellar and 8 pewter salts in the pantry of Lambeth, and 2 garnishes of pewter, with spoons, at Croydon." Again, Lord Northampton's kitchen in 1614 was "furnished with 300 pounds weight of pewter, which in great houses was put under the charge of an officer called the 'yeoman of the ewerie.'"

From England the pewter industry spread to America, and quite a number of handsome pieces are still to be found in New England country homes. It was used, too, for communion services. In 1729 the First Church of Hanover, Massachusetts, had a full set of pewter vessels for that purpose, as well as a christening basin of the same metal, and some of the pieces are still preserved by the church as relics. It is recorded that Governor Bradford, of Massachusetts, left to his heirs "14 pewter dishes and 13 platters, 3 large and 3 small plates, and several other objects," some of which were as richly lettered and marked with armorial devices as their more aristocratic fellow-ornaments in silver and gold.

BLISTERS ON ROLLED COPPER.*

By Dr. W. Stahl.

There are often noticed on rolled copper plates or sheet, warts, pockmarks, blisters or leaflike structures. The warts are caused by the rolls having uneven surfaces, a depression on which causes an elevation on the rolled copper. These protuberances are solid the whole way through, that is, do not resemble blisters except in surface appearance; it is possible by re-rolling to eliminate them.

When the sheets are overheated in the ingot furnaces, heated so hot that the surface becomes mirror-like, then there is often noticed on one side of the sheet well marked blisters having a thin skin. After considerable investigation these have been shown to be caused by overheating of the copper, whereby its surface has become softened. The copper rolled in this condition, forms blisters in combination with absorbed, compressed and expanded gases or other influences, working upon the soft side of the ingot in a way so as to separate and lift a skin formed by rolling. These are called heat-pockmarks, heat-blisters or heat-pimples. There occurs also a larger, central blister formation, when during the rolling the copper ingot is much hotter in the center than in the outer portions.

All of these pocks, blisters or leaflike structures which are caused by overheating almost always show smooth inner walls having a pure copper color. Often these formations are caused entirely by elements in the casting of the ingot. We shall not concern ourselves here with the splintery or porous structures often found, but with too cool pouring, in which either the preliminary conditions occur which cause a part of the metal to freeze too quickly, or which cause a copper oxide skin to stick to the inside of the mold. Upon rolling such an ingot nothing marked is noticed until one of the places in the ingot which has been weakened by incorrect pouring, and not being of a homogeneous structure, will cause an extremely thin plate or plates to be separated over a small area from the rest of the mass, and which will under conditions of rolling or annealing, raise and form blisters

These structures show in contrast to the above mentioned structures, dark or red colored inner walls and these colors are a certain criterion showing the ingot to be defectively cast. If the question is one only of distinctly scalelike copper, or copper blistered in the casting, then the laminæ or blisters express themselves after the rolling in long stretched out forms, and the blisters not as such in their original form but in flaws and laminæ depending in extent on their original size; and these flaws show dark or red colors on their inner surfaces because of the previous admittance of air.

*From *Metallurgie*, 13, 1912, 418-419.

FOUNDRY PYROMETERS

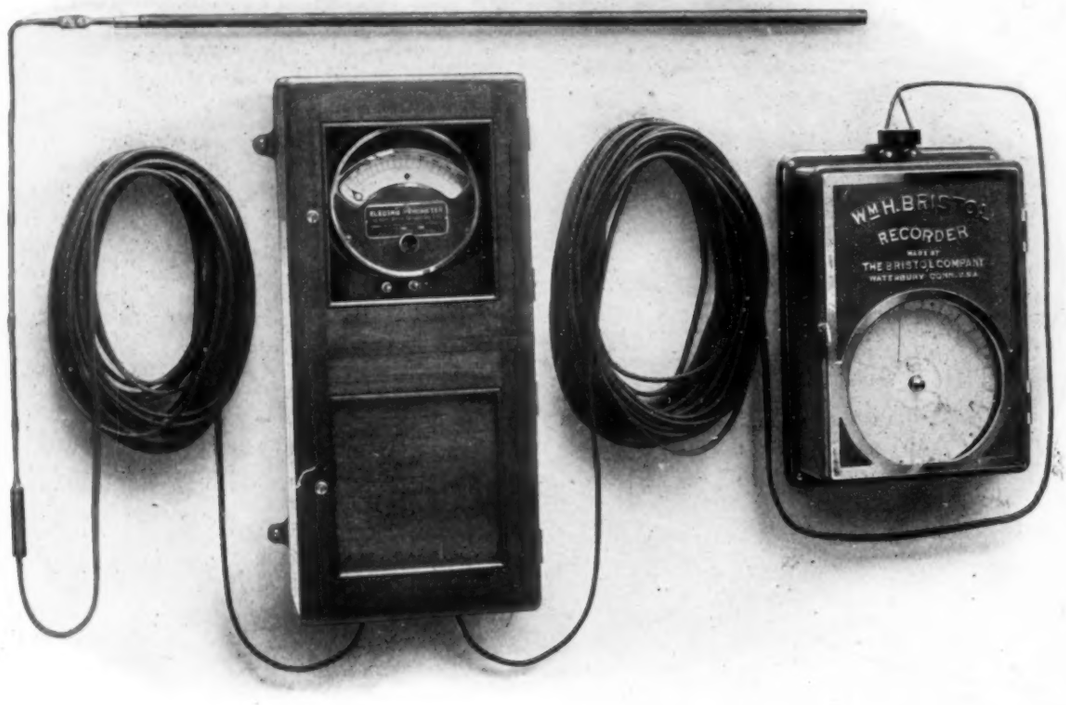
SOME OBSERVATIONS REGARDING THE USE OF APPARATUS FOR MEASURING HIGH TEMPERATURES IN THE CASTING SHOP AND FOUNDRY.

By H. W. GILLETT.

(Concluded from February.)

DESIGN OF FIRE RODS.

The greater the temperature difference between the two ends of the fire rod, the greater the current set up, and the greater the deflection of the needle. The pivots and bearings which support the needle and coil are very important since any wear detracts from the accuracy and sensitiveness of the instrument. The pivots are usually of hardened steel and the bearings jeweled like those of a watch. Any sharp jar as from a fall of the instrument is liable to damage the pivots or bearings. Some makers are now using bearings backed up by springs to avoid this trouble. Sometimes a single pivot suspension is used in which case the instrument must be carefully leveled and provision must be made for locking the needle and coil when carrying the instrument. The needle and coil are attached to a hair spring which brings the needle back to the zero point. All galvanometers should be supplied with a zero adjustment by which any stretch of the hair spring may be corrected. This also allows for adjustment to compensate for changes in cold junction temperature as will be explained later.



PYROMETER OUTFIT MADE BY THE BRISTOL COMPANY, WATERBURY, CONN.

CONSTRUCTION OF GALVANOMETER.

The electrical resistance of a coil of copper wire such as is usually used in galvanometers changes considerably with changes in atmospheric temperature, and to avoid error from this cause some makers have a device which automatically alters the distance between the poles of the magnet as the temperature changes and thus compensates for the changes in resistance; others use a coil of wire which has a negligible temperature coefficient. The portable galvanometer should be as light as possible, using a light magnet and an aluminum case. It should not be too small and should have an open scale, that is, should have a large deflection for a given temperature interval. A workman who sees a pyrometer needle moving 1/16 of an inch from the point on which it should rest is not much worried even if this distance means 50 degs. If a change in temperature of 50 degs. makes the needle move ½ inch it has much more effect upon him, thus the more open the scale the better for practical work.

Sometimes an open scale is obtained by making the moving coil and needle extremely light with a corresponding increase in the delicacy of the instrument as well as a decrease in accuracy, since the higher the electrical resistance of the galvanometer the less variations in the resistance of fire ends, and leads due to changes in atmospheric temperatures or to variation of the depth of immersion of the fire end in molten metal will affect the readings. The higher the electromotive force of the couple the more open a scale we can get and still have a robust instrument. The galvanometer needle should either lie as close to the scale as possible without touching it or else should play over a mirror so that in taking a reading the image of the needle will be directly back of

the needle itself. This is in order to avoid the parallax error or apparent displacement of the needle from its true position due to the eye being at one side of the needle instead of directly in front of it. The galvanometer should give correct readings either lying on its back so that the scale is up or standing on the end so that the scale is in front, the former position being more easy to read when the galvanometer is carried on the arm and the latter when set on a shelf. For foundry use it is essential that the case be dust proof since a very little grit in the bearings will put the instrument out of commission.

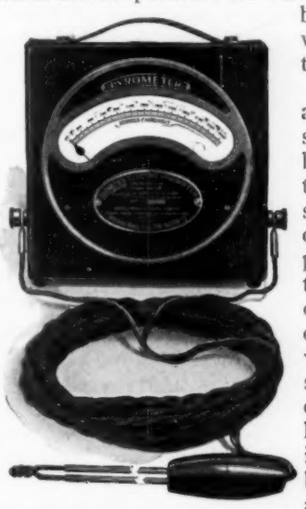
Since the pyrometer measures the difference in temperature of the hot and cold juctions of the thermo couple, it is essential that the cold junctions be maintained at the same atmospheric temperature for most accurate results. Most commercial pyrometers are calibrated for a cold junction temperature of 75 degs. F., and if the air temperature at this point is below that, the readings will be too high; if the cold junction is heated above 75 degs., by being too near a furnace for instance, the reading will be too low. In scientific work the cold junction is usually kept in melting ice to maintain a constant temperature. In commercial installation running water or an air blast can be used to keep the temperature down. Some fire ends carry a thermometer in the handle at the cold-junction, from the reading of which the galvanometer reading may be corrected. If a galvanometer has a zero adjustment the needle can be set to compensate approximately for variation in cold junction temperatures. If the air temperature is 100 degs. we can set the needle at 100 degs. instead of 75 degs.

Several automatic devices to compensate for changes in cold junction temperatures have been put on the market but none seem to meet the test of time. For permanent installations one maker uses a dry cell and a Wheatstone bridge with a variable resistance. In this way he is able to send a tiny current through the couple, boosting the current when the cold junction temperature is higher than standard and opposing it when lower than standard. The amount of current thus being sent through the couple being determined by the balance indicator. This is practically a resistance thermometer measuring the temperature of the cold junction and regulating the boosting or opposing current according to that temperature. Whether or not any such device or any correction for variation in cold junction temperature is needed is a question depending on the special conditions each user has to contend with. In furnace installations this is often pretty important. In taking pouring temperatures at the mold it is usually negligible.

If one wishes to use several fire ends with one galvanometer it is highly essential that the fire ends be absolutely interchangeable. If any fire end can be used with any galvanometer, or vice versa, it is a great advantage in case of accident since extra galvanometers or fire ends can be kept in stock. One must remember that galvanometers and fire ends from different makers will not be interchangeable and instruments and fire ends from any one maker are not always interchangeable, since some firms calibrate each galvanometer for each particular fire end. Most pyrometer manufacturers now see the evil of this and keep their instruments all to the same standard. It is often desirable to keep continuous records of temperature as in the operation of furnaces or core ovens, and for this several types of recording instruments have been devised in most of which the indicating needle of the galvanometer bears a pen or pencil which marks a chart which is kept moving at the proper rate by clock work. The best types do not make a continuous line as this introduces considerable friction of pen against paper, but the needle is periodically depressed so as to come in contact with the chart, thus making a series of dots.

LOCATION AND CALIBRATION OF GALVANOMETERS.

The recorders are usually very delicate and would not stand up if used in the foundry. The best plan is to put the recorder in the laboratory or in the superintendent's office and have an indicating instrument at the furnace or core oven for the guidance of the melter or oven tender. By a system of switches the recorder can be put on various furnaces or ovens without the man in charge knowing whether or not his particular one is connected up, thus he never knows when he is being checked up and is kept constantly on the alert. Indicating instruments are sometimes fitted with a device which will ring an electric bell when the temperature rises above a certain figure or drops below a certain figure, thus warning the man in charge that his attention is needed.



Electric Pyrometer, manufactured by the Hoskins Manufacturing Company, Detroit, Mich.

When many pyrometers are installed, some means should be provided for calibration and checking up of the instruments; for instance, one aluminum foundry uses over a score of pyrometers, and to keep these all to the same standard and in good working order, the laboratory is provided with a standard instrument used only for checking and which never leaves the laboratory. The instruments may be calibrated at certain points against the melting point of pure metals or salts, but for ordinary work, a small electric resistance furnace of the tube type allows rapid and sufficiently accurate calibration. The pyrometers should be under the control and supervision of the laboratory rather than of the foreman, and the latter should report to the laboratory when anything seems to be wrong with the instruments. In nine cases out of ten the trouble will be nothing more than a loose connection, and a screw driver in the hands of a man who knows something about pyrometers will remedy the trouble as well as sending the instrument back to the makers.

(The End.)

METRIC CARAT ADOPTED IN THE UNITED STATES.

The metric carat of 200 mg. was adopted on October 28, 1912, by representatives of the largest jewelry firms in New York. This is about 2½% lighter than the carat heretofore used in the United States, which has been 205.285 mg. The weight of the carat abroad has varied from that of 188.5 mg. at Bologna, to 213.3 at Turin. The English standard is 205.304, while former Dutch standards were 205.128 and 205.712. However, the metric carat is now the chief standard in France and the Low Countries. The new measure will go into use on July 1, 1913, and the United States Treasury will be asked to use it in assessing valuations. Of 400 votes, only nine were cast against the new weight, which will greatly simplify bookkeeping, weighing, weighing for inventory, etc. This is only a forerunner to the general adoption of the entire metric system for weights and measures.

PREPARING GRAY IRON FOR POLISHING AND PLATING

DESCRIPTION OF A PRACTICAL METHOD OF PICKLING GRAY IRON CASTINGS.

BY COL. J. H. HANSJOSTEN.*

The importance of properly preparing gray iron castings for polishing and plating should not be overlooked, for the appearance and cost of the finished piece depend largely on the care and attention given it in the preparatory process. Not only does this apply to the cleaning of the work preparatory to plating after polishing, but also to the methods employed in handling the work previous to polishing. That the work may be so handled so as to save time and material in the polishing room is often lost sight of, and is a great mistake on the part of the plater. We would not think of slighting any of the cleaning operations in the plating room, for we know that the result would be poor work. But we often let the work go to the polisher in any old shape, and then wonder why it takes so long to polish a piece of work, or why so much emery and glue are used; whereas, if we gave a little more time and thought to either the pickling or sandblasting, we would find the reason why.

As a general rule, the work is turned over to the foreman of the polishing and plating department after it leaves the rattling or mill room. Then it is clean enough for all uses, but not clean enough to be polished and plated, and must be sandblasted or pickled and scratch-brushed before it goes to the polisher. The writer mentions the sandblast because it is used in some shops to clean the sand out of the background of flowered work, and to remove the scale that is on all iron castings. It has been extensively advocated during the past few years as something that was better and cheaper than pickling. Pickling is, however, the most common method employed for removing sand and scale, and it is the writer's firm conviction, founded on years of experience, that it is the more economical method, and therefore this article will be devoted to explaining what he believes to be the best manner of pickling gray iron.

The necessity of either pickling or sandblasting is questioned by some, but this must be attributed to a lack of knowledge of the condition of gray iron castings or to a lack of attention to details in the polishing room. It is reasonable to suppose that a hard casting takes more time and material in the polishing operation than a soft one; and, as the iron comes out of the foundry quite hard and with a very hard scale covering the surface to be polished, it necessarily follows that anything that can be done to remove this scale and soften the casting will tend to reduce cost of polishing. This is more particularly true of large castings with considerable smooth surface. The sand in crevices and background is very hard to remove, and it is next to impossible to remove it with the scratch-wheel alone. The sand is so burned in the casting that no matter how carefully it is brushed, small particles of sand will adhere to it, which, after plating, show up as black spots, which quickly turn yellow and spoil the appearance of the piece. The sandblast will remove the sand and leave a clean metal background that will show up a good white deposit, but it will not remove the scale sufficiently to make any appreciable difference in the cost of polishing. A good pickle will loosen the sand so that it is easily brushed out and soften the iron so that less wheels may be used in polishing. This is where the pickle is more useful than the sandblast.

Some few shops use both the pickle and sandblast. In these shops the work is first pickled and then sandblasted, and, if the matter of cost is not considered, this gives excellent results. But it must be obvious that one or the other is a needless expense, for there is no reason why the sandblast should be used if the pickle alone will do the work.

A pickle that gives good results on cast iron, and has been used for years by the writer, consists of:

3 parts sulphuric acid,
1 part hydrofluoric acid,
3 or 4 parts water.

The length of time required to pickle the work depends on the amount of scale on it, the size of the castings, and the strength or weakness of the pickle. Small or medium sized castings may be left in it 15 or 20 minutes, while larger pieces and pieces with a large, smooth surface should be left in longer, but the length of time required for any class of work may be determined by the operator if he will watch the results that the first few batches will give. He should increase or decrease the strength of the pickle by the amount of water or acid needed, and the condition of his work demands. After the castings are pickled they should be rinsed in hot water containing about ½-lb. of lime for every 10 gallons of water. The lime water serves a two-fold purpose in that it neutralizes the acid and dries the castings. The pickle tank and hot water tank should be side by side and covered with a hood made of ½-in. boards, high enough above the tank so that they will not interfere with the work of the operator, but not so high that it will not carry off the fumes and steam caused by the acid and lime water. The top of the hood should slant downward over the tanks from a pipe or stack leading upward, so as to aid the natural draft that will carry the steam and fumes away. If the hood ends so that the fumes will be guided into a smokestack or chimney, no exhaust will be necessary, as the natural draft will carry them away.

Wood boxes, with the nails driven well into the wood and of convenient size, with holes bored in the sides and bottom, and iron wires of sufficient strength and long enough so that the ends will remain above the solution when attached to the box as a handle, make good baskets for small work. Larger pieces with holes in them may be strung on iron wire, and the ends looped together, so as to be convenient to take out. Pieces of the same kind may be reversed; that is, put face to face or back to back, so that they will not nest and thus prevent the acid from attacking them all over. Large quantities of work may be quickly handled in this way, and, by making the tank of proper length, the operator may begin to put in work at one end and work toward the other, and by the time the tank is filled the work put in first is nearly ready to come out. It is better to have the tank run to size in length rather than in breadth or depth. A tank, 30 ins. wide, 18 ins. deep and 5 or 6 ft. long, will be large enough to pickle the work for 20 to 30 polishers. Acid should be added to the pickle as it weakens, and when it becomes too old it should be thrown away and a new one made up. Lime should be added to the lime water every day or so. Both solutions may be kept in working order for a very long time by simply keeping them up to the required strength. No set rule can be laid down to go by in adding acid, or how long the work should remain in the pickle. This must be ascertained by the operator, and a little experience will quickly tell him what to do and when to do it.

*Representative Bennett & O'Connell, Chicago, Ill.

The scratch-brushing may also be made a factor in turning out good work, but is important only in a relative way. If it is improperly done, particles of sand may remain in the places where the polishing wheel will not reach, and in the finished piece will show up as black spots. The cost of scratch-brushing is so little, however, that it will be well worth while to pay some attention to it, and if the pickling is properly done, it is only necessary to brush the loose sand out of the background. An objection to pickling that has been raised is that the acid will ooze out of the work after plating and discolor it. This may occur if the work is pickled too much, but a little care will overcome it, or will not allow it to happen at all. All time and attention given to this part of the preparatory process will be amply repaid, as the result cannot be otherwise than a lower cost in polishing.

EXTINGUISHING OF FIRES IN LACQUER WITH SAWDUST

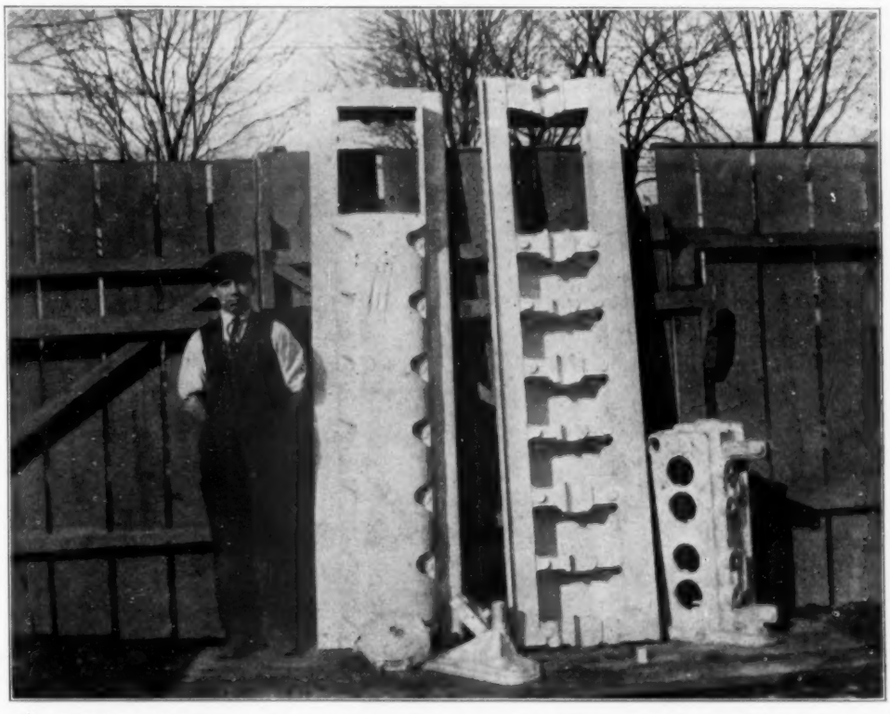
A Report of the Inspection Department of Associated Factory Mutual Fire Insurance Companies, Boston, Mass.

By Edward A. Barrier.*

In the latter part of July, 1912, word was received from the Stanley Works, New Britain, Conn., through the Manufacturers' Mutual Fire Insurance Company's office, that experiments had been conducted at that plant on the extinguishing of fires in burning lacquer by means of sawdust, and that the results had been very satisfactory. A report was also sent covering in detail two tests which had been made.

The low cost of the material used, its simplicity, which makes its use more nearly resemble the fire pail than anything that has been previously suggested, the entire absence of any automatic device likely to fail to work at time of fire, and the fact that no special training would be necessary to enable the operatives to efficiently use the sawdust seemed to justify careful consideration of the subject before it was dismissed. At the request of the department, the Stanley Works very kindly consented to repeat the tests in the presence of a representative of the department. The writer was assigned to this work, and the tests were conducted in the yard of the Stanley Works on September 23. Four tests in all were tried. Two were in tanks 37 inches long, 14 inches wide and 16 inches deep, containing about 2 inches of lacquer; one in lacquer on a wooden floor and one in lacquer on the ground. The fires in the first three were readily extinguished with sawdust, and the fourth was extinguished with sand, although requiring a longer time than the sawdust when applied to the lacquer on the wood.

Although these tests at New Britain were entirely satisfactory, the proposition of putting out fires with a combustible material, such as sawdust, seemed to be so unusual that it was felt desirable to conduct a more extended series of tests. Especially was it desired to learn the effect of varying the size of the tank, the depth of the lacquer and the kind of lacquer. Three tanks were accordingly obtained, built of sheet steel reinforced with angle irons. The largest was made 60 inches long, 30 inches wide and 16 inches deep; the middle tank 48 inches long, 14 inches wide and 16 inches deep, and the smallest 30 inches long, 12 inches wide and 16 inches deep. The joints were made tight with silicate of soda cement. Saw-



SOME LARGE ALUMINUM CASTINGS MADE BY W. R. MAMPLE, SUPERINTENDENT OF THE ALUMINUM CASTINGS' COMPANY FOUNDRY AT FAIRFIELD, CONN. THESE CASTINGS ARE FOR A SIX-CYLINDER MOTOR BOAT ENGINE AND ARE 7 FEET 8 INCHES LONG AND 2 FEET WIDE.

*Chemical Engineer.

dust was obtained from a local sawmill, both soft and hardwood. The soft wood sawdust was probably a mixture of pine and spruce, and the hardwood apparently mostly oak. One barrel of sawdust was thoroughly dried to note the effect, if any, of moisture. It was thought possible that if sodium carbonate were mixed with the sawdust, the formation of carbon dioxide, resulting from the decomposition of the bicarbonate by heat might be of help in extinguishing the fire. A bushel of soft wood sawdust was accordingly mixed with 10 pounds of commercial bicarbonate of soda and used in the cases mentioned below. An ample supply of sand was also provided.

Commercial lacquer, as used in their respective plants was obtained from the General Electric Co. at Lynn and the Stanley Works at New Britain. Nothing definite is known regarding the composition of these lacquers, but from their general appearance and odor, it is quite certain that they both were amyl acetate-pyroxylin lacquers thinned with the usual thinners, such as wood alcohol, benzine, etc. The tanks used in the tests were placed out in the open, well away from any buildings. The weather conditions were fair, although the sky was overcast. The wind blew from the northwest at a velocity of from fourteen to nineteen miles per hour. The sawdust was applied by means of a snow shovel having a steel blade 11 inches wide and 15 inches long, and provided with a handle 4 feet long. The fires were all extinguished by the writer except in the one case noted below. The following log of tests has been transcribed from notes taken by G. S. Lawler:

LOG OF TESTS.

Test No. 1—Small tank containing 2 ins. of Stanley lacquer.

Time.	Remarks.
2:20:00	Fire started.
2:21:03	Sawdust applied.
2:21:28	Fire extinguished with 2½ shovels of soft wood sawdust in 25 seconds.

Test No. 2—Small tank containing 6 ins. of Stanley lacquer.

Time.	Remarks.
2:35:00	Fire started.
2:37:17	Sawdust applied.
2:39:29⅛	Fire extinguished with 2 shovels of soft wood sawdust in 12⅛ seconds.

Test No. 3—Small tank containing 5 ins. of Stanley lacquer, left from previous tests after sawdust had been removed from the surface.

Time.	Remarks.
2:40:00	Fire started.
2:41:18	Sawdust applied.
2:41:53	Fire extinguished with 2 shovels of dry soft sawdust in 35 seconds. In this test some of the lacquer which had leaked out on to the ground ignited near the tank, but was readily extinguished with a small amount of sawdust in about 10 seconds.

Test No. 4—Small tank containing 4 ins. of lacquer left from the previous tests after sawdust had been removed from the surface.

Time.	Remarks.
2:50:00	Fire started.
2:51:19	Sawdust applied.
2:51:29	Fire extinguished with ¼ shovel of mixture of bicarbonate of soda and sawdust in 10 seconds.

Test No. 5—Same conditions as in Test No. 4 repeated.

Time.	Remarks.
2:55:00	Fire started.
2:56:03	Sawdust applied.
2:56:11	Fire extinguished with 1-3 shovel of mixture of bicarbonate of soda and sawdust in 8 seconds.

Test No. 6—Small tank with 3 ins. of Stanley lacquer left from previous tests, after sawdust had been removed from the surface.

Time.	Remarks.
2:58:00	Fire started.
2:59:03	Sand applied.
3:00:58	Fire extinguished with 9 shovels of dry sand in 1 minute 55 seconds. The tank was over half full of sand before the last flame disappeared.

Test No. 7—Middle tank, containing 2 ins. of General Electric lacquer.

Time.	Remarks.
3:15:00	Fire started.
3:17:02	Sawdust applied.
3:17:13	Fire extinguished with 2 shovels soft wood sawdust in 11 seconds.

Test No. 8—Middle tank containing 1¾ ins. of G. E. lacquer from previous test after sawdust had been removed from the surface.

Time.	Remarks.
3:20:00	Fire started.
3:21:08	Sawdust applied.
3:21:17	Fire extinguished with 1 shovel of mixture of bicarbonate of soda and sawdust in 9 seconds.

Test No. 9—Soft pine platform 5 ft. 2 ins. square provided with rim raised 2 ins. on all four sides. About 2 gallons of G. E. lacquer uniformly spread over the surface.

Time.	Remarks.
3:30:00	Fire started.
3:30:45	Sawdust applied.
3:31:38	Fire extinguished with 3 shovels of soft wood sawdust in 53 seconds.

Test No. 10—Same platform as in Test No. 9, with about 2 gallons of G. E. lacquer spread over the surface.

Time.	Remarks.
3:35:00	Fire started.
3:35:36	Extinguisher applied.
3:36:32	Fire extinguished by means of a 3-gallon chemical extinguisher, but with some difficulty, in 56 seconds. In this test if the stream from the extinguisher had not been carefully sprayed, or if the platform had not been protected with a rim, it is probable that the force of stream would have spread the lacquer all over the ground.

Test No. 11—Middle tank containing 1⅜ ins. of G. E. lacquer from Test No. 8, after sawdust had been removed from the surface.

Time.	Remarks.
3:40:00	Fire started.
3:41:32	Sawdust applied.
3:41:45	Fire extinguished with 2 shovels of hard wood sawdust in 13 seconds.

Test No. 12—Middle tank containing a small amount of lacquer and sawdust from previous tests.

Time.	Remarks.
3:50:00	Fire started.
3:50:40	An attempt was made to extinguish the fire by placing the platform used in Tests Nos. 9 and 10 over the top of the tank. After what appeared to be a sufficient time had elapsed, the platform was lifted, but the fire was still burning in the tank. Finally the platform caught on fire and was removed. The fire in the tank was extinguished with a small quantity of the mixture of sawdust and bicarbonate of soda by Mr. E. V. French.

Test No. 13—Small tank containing 1¾ ins. of motor gasoline.

Time.	Remarks.
4:20:00	Fire started.
4:20:38	Sawdust applied.
4:20:50	Fire extinguished with 2 shovels of soft wood sawdust in 12 seconds. Fire in a small amount of gasoline which leaked out on to the ground was easily extinguished in a few seconds with a small amount of sawdust.

Test No. 14—Large tank containing 1½ ins. of mixture of G. E. and Stanley lacquer.

Time.	Remarks.
4:30:00	Fire started.
4:31:08	Sawdust applied.
4:32:01	Fire extinguished with 9¼ shovels of soft wood sawdust in 53 seconds.

Test No. 15—Large tank containing lacquer from Test No. 14 after sawdust had been removed as much as possible from the surface.

Time.	Remarks.
4:35:00	Fire started.
4:35:17	Sawdust applied.
	About 3 shovels of mixture of bicarbonate of soda and sawdust were applied which nearly extinguished the fire. This exhausted the supply of bicarbonate of soda and sawdust, however, and the fire was finally extinguished in about 2 minutes with plain sawdust, although no special effort was made to get quick results.

Test No. 16—Middle tank containing 2¾ ins. of gasoline.

Time.	Remarks.
4:40:00	Fire started.
4:40:50	Dry sand applied.
	Four shovels of sand were used, but as they had absolutely no effect, the fire was finally extinguished with 8 shovels of sawdust in about 56 seconds.

REMARKS ON ABOVE TESTS.

In the above tests an effort was made to have the lacquer thoroughly ignited and burning freely before any extinguishing medium was put upon it. Although the length of time elapsing between the ignition of the liquid and the application of the extinguisher varied considerably in different tests, the fires themselves when in the same tank and the same liquid had all approximately the same magnitude. The principal reason for the wide difference in time is that in some cases the lacquer in the tanks was cold and it required some time for it to become heated, but when the same tank and same lacquer was used for another test, the fire spread and progressed much more rapidly than in the first case.

In the cases where the lacquer was used for more than one test, the sawdust was skimmed off as quickly as possible after one test had been completed, and although some of it remained in the liquid, it did not have any important effect upon the results, judging from the extent and character of the fire. The high velocity of the wind was undoubtedly a factor in making the fires more severe than they otherwise would have been, and it is very probable that all of them could have been extinguished more readily could the tests have been carried on indoors.

CONCLUSIONS.

In view of these tests, the following conclusions appear warranted:

1. Sawdust, if spread over the surface, will readily and successfully extinguish fires in inflammable liquids, particularly lacquer, when contained in moderate sized tanks such as those ordinarily used in manufacturing plants, or small fires in these liquids on the floor. The fires in gasoline in tanks up to the middle-sized one, which was used, were extinguished without difficulty, but there may be some question as to whether sawdust would have worked equally well on larger tanks.

The efficiency of the sawdust is undoubtedly due to its blanketing action in floating for a time upon the surface of the liquid and excluding the oxygen of the air. Its efficiency would be greater on viscous liquids than on thin liquids, since it would float more readily on the former than on the latter. The sawdust itself is not very easily ignited, and when it does become ignited it burns without flame. The burning embers are not sufficient to re-ignite the lacquer.

2. The character of the sawdust, whether from soft wood or hard wood, appears to be of little or no importance.

3. The amount of moisture contained in the sawdust is apparently not a factor. The dry sawdust which was used in some of the tests was prepared in order to represent the condition in which sawdust might be found after having been stored in a heated mill for some time. This material, however, was evidently as efficient as the untreated sawdust.

4. The depth of the lacquer in the small sized tank was of no importance. Although no tests were made with varying depths in the middle tanks, judging from the time it took to extinguish comparative fires in the small and middle tanks, it is quite probable that the depth would not have been a factor in the middle tank. This assumption is reasonable, because the only way in which increased depth could be a handicap would be in allowing the sawdust to sink and expose a fresh surface of liquid before the fire had been extinguished at all points. Whether or not this occurred would depend upon the length of time necessary to extinguish the fire since the sawdust requires an appreciable time before it starts to sink.

With the largest tank, on the other hand, it is quite possible that with greater depths than those tried, it might have been much more difficult to extinguish the fires. Tests at greater depths were not tried on account of the large quantity of lacquer required. This is not as important as might seem at first thought, because it appears from a number of inquiries which have been made that the average lacquer tanks in Mutual Mills are about the same size as the smallest one employed in these tests, and that only rarely would anything larger than the middle-sized tank be found.

5. Sand is not satisfactory for extinguishing fires in lacquer tanks because being heavy it sinks to the bottom and does not have the blanketing action possessed by sawdust. At the Stanley Works' tests the sand worked fairly well for fires in lacquer upon the ground, but even in this case it did not extinguish the fire with any more readiness than sawdust, and it was heavier and more awkward to handle.

6. The sawdust can best be applied by means of a long handled, light, but substantially built shovel with a blade of sufficient area to allow of taking up a considerable quantity of sawdust. The long handle is necessary to allow the operator to stand at some distance, since in some cases the fires were so hot that it was not possible to work at close range.

7. The admixture of sodium bicarbonate very much increases the efficiency of the sawdust, as shown both by the shortened time and decreased amount of material necessary to extinguish the fire. The effect of the carbon dioxide was clearly noticeable in the tests in that the flames occasionally made an effort to shoot sidewise and up from under the blanket of gas. It is probable that the bicarbonate mixture would have shown up to still greater advantage had it not been for the wind which must have blown the gas away. A further advantage of the addition of the bicarbonate is that it will greatly decrease the possible danger resulting from the presence of sawdust in mills. It would be very difficult, if not impossible, to ignite the mixture by a carelessly thrown match, or by any other ready source of ignition.

There is a possibility that some difficulty might arise from the caking of the bicarbonate, but if that should prove to be the case, it could be easily overcome by the addition of 10 per cent. of iron ore.

THE TINNING OF COPPER

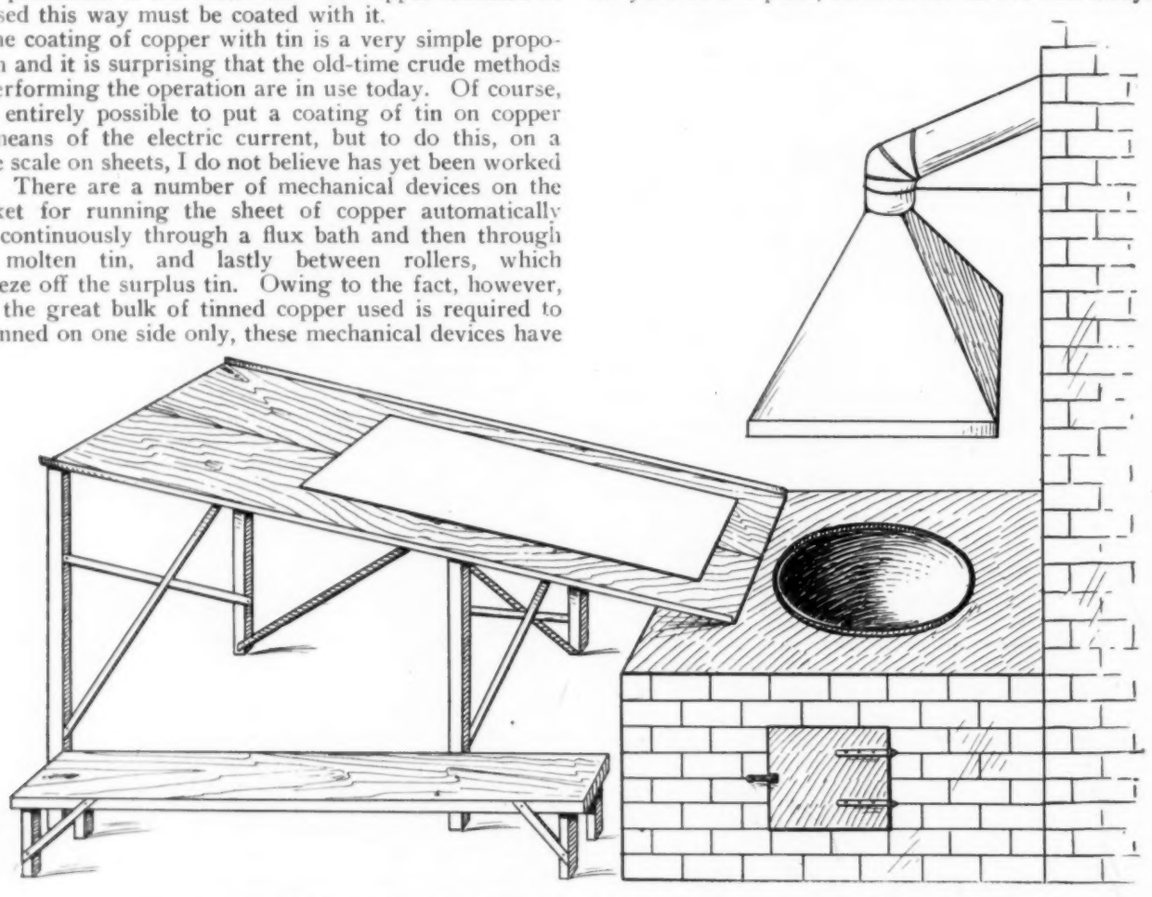
A Description of This Important Process as it is Operated at the Present Time.

By L. J. Krom.

One of the widest applications of sheet copper in every day use is in the manufacture of cooking utensils, plumbers goods and numerous other articles for the household. Among these may be mentioned, water closet tanks, bath tubs (now nearly obsolete and replaced by porcelain covered cast iron and steel), range and wash boilers, chafing dishes, percolaters and a host of other articles of like nature. As is well known, copper as a metal is easily oxidized and corroded by air and water and also is acted upon by the juices of flesh, fruits and vegetables. To this end, the copper surfaces of such articles as are exposed to such influences must be protected. The best aid to such protection is the metal tin. So copper destined to be used this way must be coated with it.

The coating of copper with tin is a very simple proposition and it is surprising that the old-time crude methods of performing the operation are in use today. Of course, it is entirely possible to put a coating of tin on copper by means of the electric current, but to do this, on a large scale on sheets, I do not believe has yet been worked out. There are a number of mechanical devices on the market for running the sheet of copper automatically and continuously through a flux bath and then through the molten tin, and lastly between rollers, which squeeze off the surplus tin. Owing to the fact, however, that the great bulk of tinned copper used is required to be tinned on one side only, these mechanical devices have so far not made any great headway. The best of them do not provide for a stop-off on one side and consequently their application is quite limited. There is, it can be readily understood, a fine chance for a machine or continuous method that will permit of tinning one side only of a sheet or tube of copper or brass.

Numerous attempts have been made, of course, to accomplish this but at the present time I do not know of any successful method or machine. Back in 1894 I remember an elaborate machine was built to tin copper sheets, rolled to 14 ounce, thirty feet long and 60 inches wide. A mixture of whiting and silicate of soda was used for a resist for one side, while the flux was the time-honored chloride of zinc. The sheets were drawn first through the zinc flux, then over and under a roller through the tin bath, and finally out between the scrubbing rollers. A beautiful job was done for two or three days and tinned copper, TINNED ON ONE SIDE ONLY and in a CONTINUOUS machine was a reality at last. Steps were taken to form a company and while in the midst of its formation the promoters were astounded to learn that the tinning machine had exploded. The resist coating on one sheet had not been dried thoroughly, a little moisture remained, some steam was generated and the whole tinning tank, some six feet wide, four feet long and eighteen inches deep, blew up in one grand avalanche of bricks and molten tin. For a number of years afterwards, chunks of tin were picked up in the yard of this plant, some as far as 300 feet away.



GENERAL APPARATUS USED FOR TINNING COPPER AND BRASS SHEETS ON ONE SIDE.

TINNING THE SHEETS.

The method, then, in general use today for tinning copper and brass sheets on one side is as follows: An iron pot, holding anywhere from 250 to 700 pounds, is enclosed in a brick furnace and heated with either coal, oil or gas as the case may be. The general arrangement is as shown in the cut; a hood is hung over the pot and connected with the chimney of the furnace. The tin used is usually Straits or Banca and is melted in the iron pot. The top of the bath of tin is covered with charcoal and chloride of ammonia (sal ammoniac) is used for a flux. Other substances that have been used for covering and fluxing are rosin, tallow, melted soap, chloride of zinc and a number of proprietory mixtures probably made from the above-named substances. At one side of the furnace and reaching to the edge of the pot, as shown in the sketch,

is an inclined bench wide and long enough to hold the sheet of metal that it is desired to tin. The metal sheet is first rubbed with a mop, soaked in chloride of zinc (made by adding zinc to muriatic acid until a saturated solution is obtained) and is then placed on the inclined bench.

The "tinner" then takes a long-handled iron ladle, holding about fifteen to twenty pounds, and dips it into the molten tin. He then begins at the top of the sheet and with a gyratory motion pours the tin onto the sheet. If he is properly skilled in the art he should be able to pour on enough tin for the whole sheet in one operation. He then drops the ladle and taking a bundle of tow he alternately "wipes" and squeezes the surplus tin back into the bath. The operator at the bench is kept supplied with sheets of metal by boys who "swab" on the tinning flux and take away the tinned sheet. A surprising number of sheets per day can be turned out by a man and one boy. This operator or "tinner," as he is called, will look after his own fire and make his own flux. The process has been carried on so long that it has been looked upon as a regular trade and those following it have become very expert. After the sheets are tinned they are run through a set of rolls cold, in order to flatten them and smooth any marks that may have been made in the brushing with the tow.

CARE OF THE TINNING BATH.

The care of the tin in the tinning pot is most important. With so much exposure to the air, while the tin is being poured on the sheet, it is inevitable that a large amount of oxide or dross will be formed. This dross is skimmed off of the top of the pot from time to time with a perforated ladle. The accumulated dross contains a high percentage of tin, not only in oxide form but also in the shape of "shot tin," sometimes running as high as 85 per cent. A large amount of metallic tin can be separated by screening and the resulting material should be sold to the metal refiners. The metal in the tinning bath will in time get thick and "ropy." This is due to the inclusion of some oxide, and this condition can be overcome to a large extent by forcing to the bottom of the pot a stick of green wood, such as hickory. This furnishes a supply of carbon which combines with the oxygen and reduces the tin. A little phosphor tin, say four ounces of five per cent. phosphorus, added daily will help to keep the bath in good shape. If a large lump of metal collects in the bottom of the pot and stubbornly resists the treatment with green wood, it should be fished out and sent to the refining furnaces, as it probably consists of a core of oxidized tin, surrounded by a coat of metal and so is impervious to local treatment.

Should it be desired to reduce the dross from the tinning bath at the local plant, it can be done by mixing the material with ground hard coal of good quality and fluxing with a mixture of carbonate of soda and fluorspar. A good formula is:

Tin Dross	100	pounds.
Coal	25	"
Sodium Carbonate	5	
Fluorspar	10	15 "

The resultant metal from this operation must be livened up by resmelting under charcoal and stirring vigorously with a green hickory stick. The most satisfactory way, however, to dispose of the material is to sell it on tin content basis to a refiner.

TINNING TUBES.

Tubes of brass and copper are tinned by dipping or immersing in a bath of molten tin. If it is desired to tin on one side only, the outside, plugs are put in each end. The flux and preparatory operations are exactly the same as described for sheet. For the tinning of Muntz metal tubes for condensers a certain amount of lead is used, usually one-third lead, as the water passing through them is not used for drinking purposes; but for an article for domestic use there can be no lead in the tinning composition.

SEPARATING GOLD AND PLATINUM FILINGS

By Oscar A. Hillman.*

If the filings are comparatively fine, the best and quickest way to separate them is to wash first in a potash dip to remove all oil and dirt, then rinse thoroughly and place in a shallow dish to dry. After the scrap has been washed and dried, dissolve the gold out by adding two ounces of commercial muriatic acid and three ounces commercial nitric acid to every ounce of scrap. The acid should be warm, but never allowed to get hotter than 100 degrees F., or it will attack the platinum also. As soon as the gold is all dissolved (it should only require a few minutes), the acid should be diluted by adding three parts cold water to one of acid.

To recover the platinum, pass the diluted acid through two ply filter paper, then pass cold water through two or three times, in order to wash out all the gold bearing acid. The platinum can be separated from the paper by dissolving the paper in a strong caustic soda solution, or the paper may be dried and burned, the final operation being to wash the ashes off from the metal. The diluted acid that has passed through the filter paper contains the gold which can be reclaimed by evaporating the acid over artificial heat to dryness, then melting the residue, which is finely divided gold, in a crucible, using borax for a flux.

If the filings are coarse, the best way to separate the metals is by the porous cup method. Make a solution using seven ounces of cyanide of potassium and one gallon of hot water for every two ounces of scrap and arrange with a porous cup the same as for running in metal from an anode. Wash the scrap in potash to remove grease, then place it in a graduate or any other tall glass and lower in the cyanide solution, which should be deep enough to cover the top of the glass containing the scrap, at least two inches. Connect the scrap with the positive wire from the dynamo, using a platinum wire or rod, and allow the current to flow until all the gold has been dissolved out and only pure platinum and iron, if any, are left in the glass. After the gold is all dissolved and the solution has cooled off, the glass should be carefully lifted out and the platinum caught on filter paper.

Platinum filings invariably contain more or less iron dust from the jewelers' files, pliers, etc., and, as the cyanide has not the power to dissolve the iron out, the scrap should be washed in dilute nitric acid before being melted for pure platinum. To recover the gold from the cyanide solution, evaporate the solution to dryness and melt the cyanide-potash-gold in a sand crucible in an open fire. The cyanide of potash acts as a flux, but great care must be taken not to inhale any of the fumes, as they are deadly poisonous.

*Electro-Chemist, Attleboro, Mass.

ARSENIC AS AN AGENT IN METAL COLORING

By Emmanuel Blassett, Jr.*

Arsenic when properly used, on work suitable for its application, is one of the most valuable agents known for producing a black color on certain metals and alloys such as nickel, copper, brass and German silver. The trioxide, or common white arsenic, is the form in which it is generally used. White arsenic is known in chemistry as arsenious acid, and it is sometimes confused with arsenic acid, which is a different chemical and more expensive. The white arsenic of commerce is the chemical that is used extensively in the plating room for coloring. Arsenic in the sulphide form has been known from early times, and its staining effect on metals was probably noticed by the ancient Greeks. White arsenic is first mentioned by the Alchemist Olympiodorus in the fifth century A. D., who produced it by roasting arsenic sulphide.

Occasionally one hears the arsenic finish condemned on account of its fading out qualities, especially when it is left unlacquered. White arsenic is cheaper than copper carbonate, potassium persulphate and other chemicals used for coloring brass, and the color imparted to novelty work by its means is sufficiently durable for a large variety of articles. When properly applied it will not fade out and the black color should last a long time when lacquered, as all novelties should be. Its universal use for coloring moderate-priced metal novelties testifies to its usefulness in the plating room, and the only question is to select the most suitable and economical solution adapted for the work to be colored.

There are many solutions in use containing white arsenic; in some the arsenic is dissolved in potassium cyanide or caustic soda, and in others it is dissolved in hydrochloric acid. Hardly two platers agree on the suitability of any particular solution, and all the solutions given in this article are used and extolled by different platers. For articles that are not lacquered the arsenic finish cannot be recommended. For instance, it should never be used for oxidizing silver-plated articles such as fruit dishes and bread trays that are usually sold without lacquering. The arsenic finish is especially adapted for all novelty work of the cheaper grades such as picture frames, ash trays, match boxes and metal buttons. The simplest formula for producing a black color on brass novelties, and one which is used by many large manufacturers, is as follows:

White arsenic	2	ounces
Potassium cyanide	5	"
Water	1	gallon

This dip is used hot and without the current. The solution is made up in an enamel or agate ware vessel, and brought to a boiling point by means of a gas stove. Work to be colored is fastened to wires or immersed in the solution by means of a plating or dip basket. Some platers make up a new dip every day or two, but by careful management, such as replacing the water lost by evaporation and making small additions of arsenic and cyanide, the dip may be made to last a long time.

Another formula of a simple nature which is extensively used, but which the writer has never seen in print, is composed as follows:

White arsenic	1	pound
Potassium cyanide	2	pounds
Water	6	gallons
Ammonium carbonate	10	ounces

The white arsenic and potassium cyanide is dissolved in 5 gallons of water, the ammonium carbonate is dissolved separately in 1 gallon of water, and the two solutions mixed. This solution is used cold, and the current is required for its operation. Steel or brass anodes may be used and a current with the tension of one volt is sufficient. Without the ammonium carbonate the deposit is not so black and is inclined to be steel gray in color. It is a difficult operation to color small, light pieces in this bath, possibly due to the poor conductivity of arsenic solutions. On very light articles the bath usually gives an iridescent color, or blue-black at the most. For this reason if a good black color is desired, the dip previously given should be used for small articles.

Another formula, which is used by some platers on large work such as lamps and chandelier parts, is composed as follows:

White arsenic	10	ounces
Caustic soda (by alcohol)	4	"
Water	1	gallon

It is claimed that by using the caustic soda purified by the alcoholic method produces better results. All arsenic solutions should be boiled a few minutes before using, so as to dissolve as much arsenic as possible. The caustic soda used in making up this solution is rather expensive, and by using a little more of the commercial variety the results should be the same.

Still another arsenic bath is made up as follows:

White arsenic	3	pounds
Potassium cyanide	4	ounces
Commercial caustic soda	1½	pounds
Water	5	gallons

The ingredients are boiled together. Soft steel or brass anodes are used, and a current of about one volt is required.

A favorite bath with some platers is composed as follows:

White arsenic	2	pounds
Copper carbonate	4	ounces
Potassium cyanide	2½	pounds
Water	5	gallons

In addition to the solutions described, which are all alkaline in nature, there are several acid arsenic baths that are frequently employed. The most simple is composed as follows:

Muriatic acid	5	gallons
White arsenic	2	pounds

Carbon anodes are often used in operating this solution, and for that reason it is sometimes spoken of as the "carbon solution." Acid solutions are indispensable on work where a portion of the surface is stopped off with an asphalt paint or varnish. Strong alkaline solutions ordinarily will remove paint or varnish and spoil the finish, unless unusual care is exercised.

A well-known acid bath is composed as follows:

Muriatic acid	1	gallon
Iron filings	4	ounces
White arsenic	4	"

This formula is very suitable for producing an oxidized brass effect. The coating is a little heavier, as iron is deposited simultaneously with the arsenic. The deposit is soft and may be easily relieved for a cut through finish. In all acid baths it is best to use either carbon or brass anodes. If iron or steel anodes are used, they are attacked by the acid, producing a very concentrated solu-

*Foreman Plater, Burlington Mirror and Plating Company, Burlington, Vermont.

tion. Under such conditions particles of undissolved iron may interfere with the operation.

Some platers prefer to use iron sulphate instead of iron filings, and make up their solution as follows:

Muriatic acid	5	gallons
White arsenic	1	pound
Iron sulphate	1	"

In some instances certain platers prefer to use sulphide of arsenic or yellow arsenic instead of white arsenic, claiming to obtain better results. The writer has never found any advantage in using this chemical for the solutions given in this article. It is more expensive than white arsenic. White arsenic, in the early days, was used considerably in making up the so-called black nickel solutions, but it is rarely used in nickel solutions at the present time. Until some cheaper and better method is discovered, arsenic solutions will continue to be used quite extensively in the plating room for the purpose of coloring.

THE DUST PROBLEM IN A POLISHING AND BUFFING ROOM

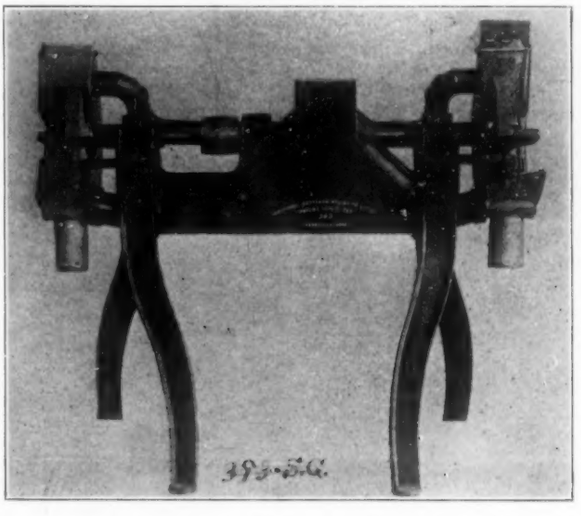
By T. C. Eichstaedt.*

The matter of dust in a polishing and buffing room is quite a problem to deal with from more than one viewpoint. A large majority of the states now have laws compelling firms to install some kind of apparatus to keep the dust out of the room, in order that the air may be pure for the welfare of the employees; also as a precaution against fire. Many of the employers of polishers and buffers consider this forced installation as an extra expense. But in reality this is not the case, for not only is it beneficial to the health of the workman, but the dust collected by means of a dust collector in connection with the exhaust fans or blowers is frequently of considerable value. This is especially true where brass work is ground, buffed and polished, as the dust can readily be sold to refiners. Then, too, if the room is cleared of dust the workers can accomplish better results.

There are many schemes of installing these exhaust fans, the most common of which is as follows: A fan or blower of sufficient capacity for the number of lathes in use is generally placed at one end of the room, driven by a belt or directly connected with a motor. The latter is the most economical and the better of the two. Then the polishing and buffing lathes are placed in a straight line and a large galvanized iron pipe, having openings with intake pipes and hoods for each wheel, is run on the floor behind each lathe. While this is the best possible way that has been evolved so far, it is not very satisfactory, for, no matter how carefully it has been placed, the first few lathes nearest to the fan get fairly good suction, the farther down the line the less suction, until at the end of the line there is practically no suction. Naturally this will not keep the room clear from dust nor carry away all the dust that is forced into the pipe from the wheel. The pipe therefore has to be frequently cleaned out or it will clog up entirely. Many fires have been caused by buffing lint being lodged in the pipe, as sparks from an emery wheel, when grinding steel and iron, are drawn into the pipe and ignite the line. Sometimes the fire smoulders for a while and, if it breaks out at night, will probably cause the loss of the entire plant.

Also the above scheme is not only a dangerous one, but also is quite expensive. The expense is not all in the cost of installing the system, but the matter of maintenance is quite an item; in fact, it often reaches as high a figure as the upkeep of the entire line of polishing and buffing lathes. The repairing of the fan, which is constantly getting out of order, is the first item to be considered. Either the bearings are worn out or the fan is broken, or the belt is parted. It is necessary to have the belt rather tight to keep the fan running at full speed. Now the belt on a blower is generally soaked with oil, which is splashed on it from the boxes from the fan, owing to close quarters. The writer has found this to be one of the greatest sources of annoyance with the blower system. Then comes the cost of power, which is the largest item in a polishing room of any size, as it takes about as much power to run the fan of sufficient size as it does to run fourteen lathes.

Then, too, the blower makes a great deal of noise when running at its best. If a little lint from a buff is caught by the fan and lodged on one of the blades, it knocks the fan out of balance, which causes a great racket. Furthermore a dust collector must be installed, for the dust must be forced out of the blower. Some blow it on the roof, some out of a window, while others force it into the chimney. Still the best is a dust collector in the shape of a huge funnel of the cyclone type with a vent. The heavy dirt falls into a receptacle, while the fine or light



THE ATHY DUSTLESS DOUBLE POLISHING MACHINE, MANUFACTURED BY THE DUSTLESS LATHE AND SUPPLY COMPANY, CLEVELAND, OHIO, AND SOLD IN DETROIT, MICH., BY FREDERIC B. STEVENS.

dust goes out of the vent. These collectors are generally placed outside of the building.

The writer has evolved several theories for improving the blower system, as he has had a wide experience in operating them, but has never put his ideas to a practical test. Recently I have learned of a scheme which has not only solved the difficulty as to effectiveness, but to expensiveness as well. Before going into an explanation of this new scheme or system, which I consider the best for the trade and the most economical to install and operate, I shall endeavor to show why I believe it to be such. Every concern running a polishing and buffing room knows that there are times when they are not very busy and do not have all their men working, but the blower has to run just the same. Hence, the power

*Expert plater and polisher, Piqua, Ohio.

cost and wear and tear on the blower is just as expensive as if the whole force of men were at work. Also, there are times during every day when some lathes do not need the blower, but the blower consumes just as much power when one man or ten are working. Again it is almost impossible to keep a polishing room warm in the winter on account of the volume of air that the blower is constantly drawing out of the room. Then, too, there is always a draught in a polishing room.

The machine, to which the writer has reference, is designed to run as a double polisher. Each of the two independent arbors has its own suction fan, permitting two workmen on the same machine to be independent of each other. One may stop to change his wheel or for any other purpose, while the other continues his work. This feature contributes to a great saving of time over the old single spindle. This machine is designed to collect its own dust, thereby doing away with the need of a large fan and dust collecting system, which is a continual expense. It is built for polishing or buffing large work, is especially adapted for stove manufacturers, and is strongly constructed, spindles being made of Cumberland steel, turned, ground and running in nine-inch babbitted bearing—felt-oiling. The hoods are especially constructed of iron and steel, adjustable to any size wheel from six to sixteen inches in diameter. The side door slides back automatically when the top of hood is lifted. The short pipe extending below is constructed so that, if a piece of work should get caught or is dropped by the workman, it will drop to the floor, thus keeping it from getting caught in the fan and probably getting lost. Its dimensions are as follows:

	Inches.
Height from floor to center of spindle	36
Diameter of spindles in bearing	1⅝
Diameter of spindles between flanges (can be made any diameter from ¾ to 1¼ in.)	1¼
Entire length of both spindles	62
Length of spindles from inside of collars to extreme ends	6
Size of pulleys on spindles, if tight, 5x5; if tight and loose	5x4

Furnished with either tight or tight and loose pulleys.
Approximate weight when packed for shipment, 500 lbs.

The above description and the accompanying illustrations, the writer believes, will demonstrate to any wide-awake concern an invention which will overcome the above difficulties. The cost of operating is not only lower than under the blower system, but the machine is very effective in taking care of the dust and in keeping in the heat, or rather in not taking it out of the room. These lathes can be either belted from above or below, and can also be driven by a motor, which is the most economical way of operating them. It certainly would pay any concern, who is contemplating installing a new blower system or making any changes in their plant, to investigate this scheme.

THE COLORING OF EXTRUSION METAL

A Description of the Formulas and Methods Used in Performing This Kind of Work.

By Charles H. Proctor.

There are so very many formulas and methods for coloring extrusion metal, oftentimes termed architectural bronze, that space does not permit giving them all in detail. However, I will briefly outline the methods to be pursued and the formulas to be used to obtain the different commercial finishes upon this metal. For the hardware greens and blues the following formulas are used at a temperature of 160 degrees F.:

Sodium hyposulphite	4 ounces
Acetate of lead	2 to 4 ounces
Water	1 gallon

Sodium hyposulphite	6 ounces
Nitrate of iron	3 ounces
Water	1 gallon

These solutions produce various tones which are usually relieved with the tampico wheel and pumice stone the same as brush brass.

For lilac tones use the following solution at a temperature of from 160 to 180 degs.:

Water	1 gallon
Muriatic acid	2 quarts
Butter of antimony	½ to 1 ounce

In preparing this solution, mix the butter of antimony thoroughly with the acid before adding to the water. Care should be used not to carry any more water than possible upon the articles to be colored previous to immersion.

The following formula will produce Flemish brass tones:

Water	10 gallons
Muriatic acid	1 quart
White arsenic	1 to 2 ounces
Sulphuret of potassium	¼ ounce

To prepare this solution, dissolve the arsenic in part of the acid by the aid of heat, then mix with the balance of the acid and water. Use at a temperature of 160 degs.

For bronze tones use a solution consisting of:

Yellow sulphide of antimony	2 ounces
Caustic soda	4 ounces
Water ammonia	¼ ounce
Water	1 gallon

The articles should have one or two immersions and should be scratch brushed dry. Sulphuret of potassium may also be used in the proportion of two ounces to the gallon of water and used at a temperature of 160 degs. Such articles should be brushed dry and then given a second immersion to deepen the tones of bronze, and finally brushed dry, using soft brass wire brushes. The sulphuret of potassium and the yellow sulphide of antimony colors may be darkened by immersion in a solution of sulphuric or muriatic acid (one ounce to the gallon), or two ounces of sulphate of copper to each gallon of water, used cold.

After lacquering, various green or other tones may be produced in the relief work by mixing up dry colors, such as the chromes with zinc white, such as greens, blues, yellows and blacks; mixed with turpentine and a very small amount of turpentine copal varnish, about a teaspoonful to a pint of turpentine or a little more. These colors dry opaque in a few minutes, especially if heat is applied. The colors may be relieved, without affecting the lacquer, by rags moistened with a mixture of equal parts of boiled linseed oil and turpentine. By using very fluid mixtures of the colors and stippling with a stippling brush, crystallized effects may be produced in imitation of verdes of the various tones. The colors when dry may be waxed down in the regular manner. Orange chrome and finely divided oxide of iron, such as jewelers' gold rouge, mixed as described, give rose gold effects. Soluble blue and the oxide of iron give Venetian bronze tones. So the combination of colors is almost unlimited.

CANADIAN PLANT FOR MANUFACTURING STEAM, AIR, GAS AND WATER WORKS METAL GOODS

OSCAR B. MUELLER,
President.

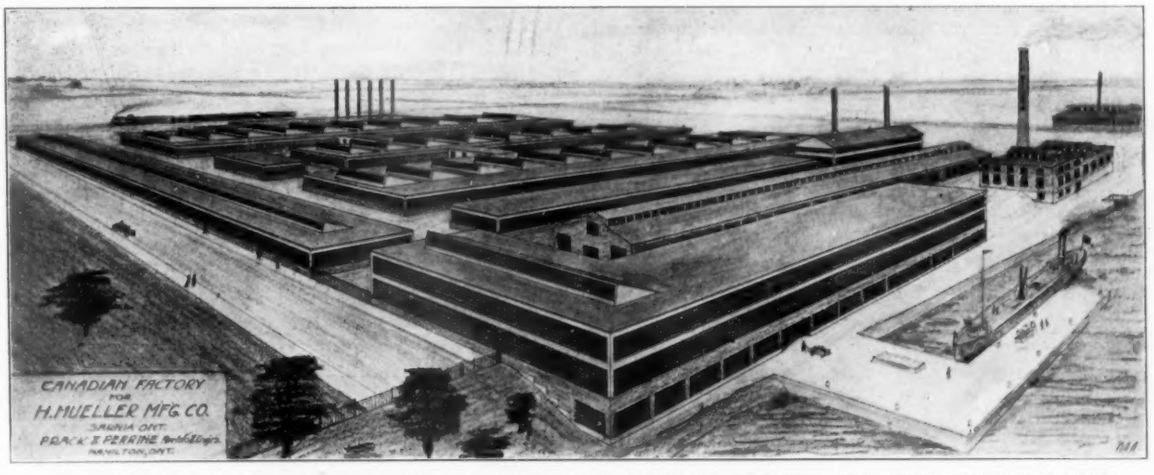
ADOLF MUELLER,
Treasurer.

The photograph shows the Canadian plant of the H. Mueller Manufacturing Company, manufacturers of plumbers, steam, water, air and gas goods, Decatur, Illinois, which has begun operations in Sarnia, Ontario. A new incorporation was formed for the Canadian plant, the H. Mueller Manufacturing Company, Ltd. A slight change has been made in the ownership as compared with the Decatur institution, some of the managing employees in Canada having stock in that company. Otherwise the stock is held in the Mueller family. Sarnia is on the Canadian side of the St. Clair river, opposite Port Huron and 60 miles from Detroit.

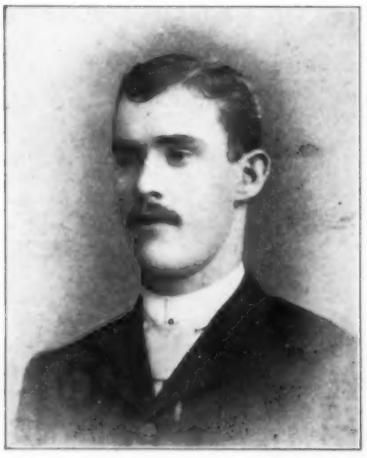
For a factory site the company purchased 73 acres, a part of which at least had been one time devoted to a manufacturing enterprise by the Standard Chain Works, of Pittsburgh, Pa. The site is most advantageous from a shipping viewpoint. The Pere Marquette railroad crosses the tract, and there is a big wharf on the river front. River and lake offer cheap transportation rates, and this will serve as a buffer against possibility of high rail rates. The wharf, doubtless, will be of great value to the manufacturers, facilitating water shipments. On the site when the purchase was made was a factory building 44 x 250 feet. The plans for the new plant show a group of buildings which ultimately will comprise the plant, but for the immediate present only two new structures have been erected.

The long building, facing the north, which is the brass finishing department building, together with the building shown on the east with the six smokestacks, the foundry building, and the power plant as shown on the river bank have been erected, while the other buildings will be added if the business justifies it. The brass finishing department building is 60 feet wide by 256 feet long. The foundry building is 60 feet wide by 190 feet long, while the building now upon the grounds is 44 feet wide by 250 feet long. All of these buildings are so constructed that sections can be added to either end should additional space be required. The construction is all concrete and steel, so that the buildings are fireproof. The roofs are the saw-tooth type, with the most approved lighting and ventilating devices, so that the workmen are assured the greatest advantage from ample light and plenty of fresh air. The sides of the buildings are largely windows, with steel sash and ribbed glass, which for factory purposes is now recognized as the best type of construction, not only for the workmen, but for the investor.

In the operation of the Canadian plant there is to be no material changes except such as are necessary because of the geographical location. The policies of the company, the quality of the goods will be the same as in the parent business. The managers of the Canadian establishment, of course, have the advantage of all the experience of years that has come to the managers of the Decatur institution, and have the advantage, too, of a plant absolutely new, with all appliances new and of modern type. The plant is geographically located at a strategic point. Sarnia is the westerly limit of eastern Canada, practically on the dividing line between the old and well developed country and the western Canada, where the great development work is now progressing so successfully. Thus the plant is admirably located for



THE NEW PLANT OF THE H. MUELLER MANUFACTURING COMPANY, DECATUR, ILL., JUST BEING PUT INTO OPERATION AT SARNIA, ONTARIO, CANADA.



FRANK POWERS,
Foreman, Nickel Plating and Polishings.

serving the trade demands in the older section of the country, and the trade is certain to come with the continued development of the great grain growing section further west.

The officers of the Sarnia company are: O. B. Mueller, president and general manager; C. G. Heiby, vice-president and superintendent; Adolph Mueller, treasurer; Fred L. Riggin, secretary, assistant treasurer and assistant general manager. The directors of the company are: Philip Mueller, Fred B. Mueller, Robert Mueller and the officers.

Among the men who will operate the new plant, in addition to those mentioned above, are: Richard Lau, foreman of the foundry in Sarnia; Frank Powers, foreman of nickel plating, polishing and buffing; C. W. Padgitt, shipping clerk from the New York office, in charge of the new factory's shipping department and stock department; Arthur Carroll has charge of the upkeep of stock department in Sarnia, and P. W. Blair is foreman of the brass finishing department. C. H. Laughlin has charge of ground key work; John Burkam in charge of the drafting department; Robert S. Thrift of the accounting, collections and credits; C. P. Harry of the sales department in Sarnia, and H. B. White, who is secretary to Oscar B. Mueller.

Approximately 150 men are now employed and the estimated output of products is valued at $150,000 annually. It is expected that the plant will begin to manufacture goods about the first of May. Power is now being used, however, to make tools and patterns.

THE JOINING OF METALS*

By Alex. E. Tucker, F.I.C. (Birmingham.)

(Continued from December, 1912.)

LIQUID BRAZING.

Several patents have been taken out for details of apparatus in which a bath of brazing spelter has been kept liquid. The parts to be joined are dipped in the molten metal, the metal being prevented from adhering to the parts that have not to be brazed by applying a coating of blacking to them. The advantage of this method consists in the fact that less metal is used in making the joint, as so little is lost in applying it, and also the heat is general on the joint instead of being local, and I have no doubt that on routine work the consumption of gas for heating is less than when blowpipes are used, and of course blast is not required.

A modification of brazing is the use of copper in the form of sheet or wire. Under the Simpson patents tools are thus made in which the cutting part is a small piece of high speed or other steel, while the shank is mild steel or iron. In making, say, a lathe tool by this process, a bar of square mild steel is taken, and a channel planed or milled out on it in which a suitable square piece of high-speed steel fits. The two or three sides being clean, strips of copper are fitted in with a special flux, and the whole highly heated to the fusing point of the copper. After welding, the compound tool is cleaned up and treated for hardening and tempering in the ordinary way. There are some features about this process of building up tools which seem to have considerable merit. First, if ordinary brazing were used, the hardening of many tools implies such a temperature as would often destroy an ordinary brazed point. The zinc would possibly be volatilized, which is not the case whenu copper alone is used, the temperature of fusion of the copper being so much higher. Secondly, it is conceivable that the weld would be considerably stronger than with an alloy of zinc, because while copper alloys to a considerable extent with iron, the same cannot be said of zinc, which therefore under such circumstances would become a deteriorating element. Thirdly, the saving of expensive material, such as alloy steel, must be considerable in the case of heavy machine tools, as only a small portion of metal is ever in actual use. In a sense, therefore, the shank becomes a tool-holder without the disadvantages of the latter in respect to unsteadiness, difficulty of setting, etc. The process lends itself to many interesting applications, thus milling cutters may be made having a core of mild steel instead of tool steel. Hardening and tempering such cutters is a source of much difficulty and loss through distortion and cracking, and if the compound cutters can be so produced the possible economy should be considerable. There is no doubt as to the perfection of the join, as I have seen pieces of steel joined by the process which on splitting did not part at the weld, the original metal appearing to be the weaker material.

THE BRAZING OF CAST IRON.

A process has been invented by F. Pich (Berlin) for the hard brazing of cast iron in a smith's hearth. The patent consists in the decarburization during brazing of the cast iron surfaces to be united, and in bringing at the same time the molten brass solder into close contact with the cast iron surfaces which are decarburized, but without exposure to the air. For the decarburization of the surfaces copper oxide is used, which is mixed with borax, as a flux, until it has the consistency of a paste. This is applied to the surfaces to be joined, which must be carefully cleaned. The cast iron pieces are then firmly tied together with wire and heated. The borax first melts, protecting the surfaces from oxidation, and taking up any oxide that may be still clinging to them. It also precludes the attacking of the copper oxide by the oxygen of the air. As the heating proceeds the copper oxide fuses and gives up to the now red-hot surfaces its oxygen, which combines with the graphite of the cast iron forming carbon monoxide and dioxide, while the metallic copper is set free in a very finely divided state. This alloys with the brass solder as it melts when strewn on, and the new alloy combines with the decarburized iron of the surfaces which it is desired to join. Specimens of cast iron united by this method were prepared and subjected to tensile and breaking tests, and the summary of all the results shows that when the brazing of cast iron pieces is carefully performed according to the

*From a paper read at London meeting, Institute of Metals, September 25-26, 1912.

details given by Pich, the strength of the pieces so joined is virtually equal to that of the solid material.

THE SOLDERING OF ALUMINUM.

As is well known, numerous patents have been taken out, and numerous mysterious mixtures have been advertised for the so-called soldering of aluminum. In nearly every case the result is that, while fairly satisfactory for a short time, the join failed after a time, varying from a few days to some months. One of the most severe tests to which such joins in aluminum can be subjected is that of warm steam. Joins which look well and are apparently mechanically strong fail rapidly when submitted to this test. In all soldering, it is obvious that the flux used must efficiently clean the surfaces of the metals to be joined, otherwise no alloying of the solder used with the surfaces is possible. In the case of aluminum very few materials adapted for such fluxes are available, the requirement being that they shall absorb oxide of aluminum.

Another detail of importance is the great heat conducting of the metal. A consideration of the results obtained with all the so-called solders of aluminum shows that the metal is so susceptible to electrical action and oxidation that the use of any metal in which aluminum itself does not preponderate is hopeless. The best results have invariably been obtained when the solder was of the same composition as the material to be joined. This condition involves the principle of autogenous soldering, which will be subsequently dealt with. The best flux used is a mixture of alkaline aluminum chloride, with the addition of fluorides, such as potassium fluoride or calcium fluoride. When these are mixed in suitable proportions and damped with alcohol, and heated on a strip of aluminum, the surface of the metal is cleaned perfectly. It therefore follows that if two surfaces of aluminum are so cleaned, and an alloy containing a high percentage of aluminum, with such addition of other melted metal as will reduce its melting point slightly below that of pure aluminum, applied with the flux named, that a very satisfactory join will be obtained. The heat such as from a spirit lamp or bunsen-burner must, however, be applied from below the work. I have seen such joins made over a spirit lamp which stood every test, including that of the steam test.

Difficulties arise from the presence of high percentages of aluminum in alloys in connection with soft soldering. These may be largely overcome by coating them electrically with copper. The following directions for soft soldering their alloys, containing from 5 to 10 per cent. of aluminum, have been issued by an electric smelting company: "Cleanse well from dirt and grease. Then place the part to be soldered in a strong solution of sulphate of copper, and place in the bath a rod of soft iron, touching the parts to be joined. After a while a copper-like surface will be seen on the metal, remove from the bath, rinse quite clean, and brighten the surfaces. The surfaces can then be tinned in the ordinary way." It is obvious that these directions are intended to be used only where an ordinary electrotyping plant is not available.

AUTOGENOUS FUSION.

The second method of joining metals referred to is that of autogenous fusion or running liquid metal of similar character on to the surfaces to be joined, and in its simplest form is very old. It is illustrated in the case of lead-burning. In the wiping of lead joints for water services we have an example of semi-fusion welding, for, as is well known, the metal used, invariably a mixture containing a high percentage of tin (lead 33, and tin 67), is always in the plastic state during the operation. Great skill is shown by the workman, who frequently makes his own metal, not only in so adjusting the addition of the tin that he can tell by its appearance whether he is right or wrong, but also in his use of it, because the heat at which he applies it has to be adapted to the work in hand, and judgment must be further exercised in seeing that the successive layers he applies are really melted or crystallized on to the preceding chilled ones without any "cold shutting." This process of wiping a joint looks very simple, but undoubtedly it requires a great deal of experience and observation for its successful practice, and many branches of plumbing in which the various pieces of lead are joined show a very high order of technical and manipulative skill.

On the other hand, I am told by good practical men that if they had their choice there are many cases where they would not wipe the joints. Thus, if a union or cock has to be fixed in a lead pipe, the pipe can be coned or socketed and tinned inside, and if the union or cock to be fixed is also tinned and driven in the pipe, and tinman's solder with extra tin be melted in the annular space with a soldering iron and finished with a blowpipe, a perfectly satisfactory join results. I think that this is so is obvious, as the bursting strength is clearly greater at such a point than that of the pipe itself. It is also obvious that the bursting strength of most of the wiped joints is unnecessarily greater than that of the pipe on which they are made, and so expensive metal is correspondingly wasted. Two ends of lead pipe may be joined perfectly by fitting one into the other and tinning both surfaces and using solder, as above mentioned. Such joints, however, are not recognized in England by public authorities, though I have often seen them, with variations of detail, on the Continent. Thus I have seen a tinned brass tube inserted in the two ends and the whole soldered up—this makes a very neat and cheap joint.

THE OXY-ACETYLENE PROCESS.

In practice I have found that a proportion of four volumes of acetylene to five of oxygen gives much better results than the theoretical two volumes of acetylene to five of oxygen. So important is this detail that blowpipes are now generally constructed to consistently maintain a reducing flame. Such a blowpipe is that of the Drager-Greishiem. In this blowpipe the automatic reducing valves on the cylinders are fitted with gauges, which, instead of being graduated to pressure, are marked with the thickness of the material to be welded—all, therefore, that is necessary is for the workman to adjust the springs on both regulators, so that both gases indicate the same thickness. A simple mechanical mixture is arranged on the blowpipe, making the whole apparatus very practical and convenient.

(To be continued.)

SPECIFICATIONS FOR AUTOMOBILE BRONZES.

The following specifications for bronzes were accepted at the recent meeting in New York of the Society of Automobile Engineers: Hard bronze, 87 to 88 per cent. copper; 9.5 to 10.5 tin; 1.5 to 2.5 zinc. Gear bronze, 88 to 89 per cent. copper; 11 to 12 per cent. tin; 0.15 to 0.30 per cent. phosphorus. The hard bronze, it is explained, is identical with the United States Government bronze G, having a tensile strength of approximately 35,000 lbs. per square inch. It is offered as a general utility bronze for severe working conditions where heavy pressure and high speeds obtain, for light gears, valves, etc. The gear bronze, it is added, is commonly known as English gear bronze, and is serviceable for gears and worms where the requirements are severe, especially when quiet running is a desired feature. Some makers, it appears, temper this alloy with a ferrous hardener.

EDITORIAL

OLD SERIES. Vol. 19. No. 3. NEW YORK, MARCH, 1913. NEW SERIES. Vol. 11. No. 3.

THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
TELEPHONE NUMBER, JOHN 689 CABLE ADDRESS, METALUSTRY

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AMERICAN ELECTRO-PLATERS' SOCIETY

The fourth annual banquet of the National Electro-Platers' Association of the United States and Canada, an account of which is given in this issue of THE METAL INDUSTRY, demonstrated one thing which stood out in prominence above everything else achieved by the association during its existence: This is its size. Here is an organization barely four years old and it shows a membership of 350 by its latest bulletin! The rate of growth surpasses any educational society of its kind, so far as we know. We believe we are correct in stating that the wonderful expansion that this platers' society has enjoyed and is enjoying exceeds even the hopes of its founder and three times president, Charles H. Proctor.

The immediate result of this growth has shown the pressing need of a reorganization and revision of the constitution. To this end, the convention just closed was called and delegates from eight branches attended the deliberations at the several sessions. The first of these sessions, held on Saturday, February 22, was given over to a discussion of change of name of the society and revision of the constitution. It is proposed to change the title to The American Electro-Platers' Society, and it is to be hoped that this will be adopted.

At this time it might be well to say a few words regarding the new constitution and the scope of the society. By this we mean in regard to classes of membership. At this time the membership is composed of three classes, as per the present constitution:

ARTICLE 2.—MEMBERSHIP.

"SECTION 1.—The membership of the association shall consist of three classes to be called respectively: Active, Associate and Honorary.

"SEC. 2.—Active Members—These shall consist of Foremen Electro-Platers and Electro-Chemists.

"SEC. 3.—Associate Members—These shall consist of representatives of supply houses directly interested in electro-plating in its different branches.

"SEC. 4.—Honorary Members—These shall consist of any person whose knowledge or services would be pre-eminently valuable to the association."

According to the usual acceptance of the term, an "active" member of an association is one who is actually engaged in the pursuit the association caters to or covers; or one who is enthusiastically interested in such pursuit. An "associate" is one who wishes to associate, ally or combine with "active" members in the furthering and advancing of the interests of such association. As a rule associate members are those who, while associated with a society, are not so situated as to take an active part in the proceedings. With the above definition in mind we cannot confess to seeing any difference at present between active and associate members, except in qualifications for

such membership. In fact, anyone present at the banquet on the 21st of February last, might have noticed as much "activity" on the part of the "associate" members as displayed by the "active" ones.

We hope, then, that the new constitution will embody such changes as to admit all interested and enthusiastic persons to the active membership and to establish a new class of associate members, who might be recruited from the junior set of men who are striving all the time to make themselves qualified to become foremen platers and chemists. In this way, by the aid of the society, would the supply of men to rule and direct in the art of electroplating be augmented and the future of the profession be assured.

An excellent example in broadness of purpose and desire to help the world in general is shown in the action of the Chemists' Club of New York City. The club, which has what is considered the finest chemical library in the country, has thrown this collection of books open to the members of sister societies, and even further than that, to the general public! Why could not the Platers' Association arrange to place their publications on file in this and other libraries, and thus make most valuable additions to existing literature?

EFFICIENCY IN MANUFACTURING OPERATIONS

To the Editor of The Metal Industry:

The article by P. W. Blair on "Increasing the Efficiency of a Brass Manufacturing Plant" in The Metal Industry for January, 1913 is very interesting, but would be much more instructive if he had used the exact words of Feiker, Gantt and Taylor as found in "How Scientific Management is Applied," published by the System Company.

Mr. Blair writes, "Efficiency resolves itself into the following programme.

First—"Investigation by an expert 'of each department' in the shop to ascertain whether there is waste of any sort and how that waste may be minimized." I should much prefer that the expert be not 'of the department' but rather a man of broad experience (the more he knows of shop work and methods outside of the department the better), who should study the methods and operations of the ordinary workman as well as of the expert workman, and in nine cases of every ten, he will find some operations of the ordinary workman that are far superior to some of the expert workman's operations, although as a finished workman, the expert will be far superior to the ordinary routine worker."

The idea is to get the best operations of each man and use these as standards. If the investigator is "of the department" he is very liable to be prejudiced to his own method, even though his may not be the best. But the investigator, who is controlled only by the management of the whole shop has no pet methods for any department. He can without prejudice, study the methods and operations and draw out the ideas of the ordinary worker as well as of the expert workman, thereby accomplishing more for employee and employer. It is possible to take an expert workman out of one department and train him to be an expert investigator in other departments, then said him back as an investigator for the department from which he came, but don't attempt to do this until he has entirely overcome all pet schemes he had in connection with the old department. A few months spent in machine or tool shop will broaden him and increase his knowledge of automatic machinery and may give him an idea as to how a certain manual operation in the mill proper can be made automatic. So on down through the list of departments—each department the investigator tackles should make him more proficient for the next.

Second—Mr. Blair writes, "Assign each day a specified amount of work for each man to accomplish." This method would limit a man to a certain amount of work each day, and is not in accord with the idea of efficiency, as generally understood. No man should have just enough work ahead for one day if the best is expected of him.

Third—Mr. Blair writes, "All up-to-date plants operating under efficiency have cut out piecework and adopted the premium or bonus system of wage payment, as it has proven the best for employer and employee."

We do not agree with him, and the horrible example he gives may be applied to the bonus or premium systems, if the same slipshod methods are used in determining the standards as were formerly used in setting piece work rates.

For instance, suppose one thousand pieces or pounds had been set as a standard for a day's work, for which the employer is willing to pay two dollars. This equals twenty cents per one hundred pieces or pounds and all over one thousand pieces to be paid for at the rate of ten cents per one hundred (one half rate).

As the operator becomes more proficient he may put out say, fifteen hundred per day or five hundred pieces or pounds over the standard.

The extra five hundred being paid for at rate of ten cents per one hundred, the man would be earning two and one-half dollars per day. After he has been on such a job some months he may be able to do even more than fifteen hundred per day, but would not care to do so, fearing the employer would raise the standard day's work from one thousand to say, fifteen hundred, then the illustration given by Mr. Blair of the green young man starting in the polishing department of a brass manufacturing plant can be applied to the bonus system of wage payment.

If the standard amount of work has not been arrived at carefully and scientifically, the men themselves may set fourteen or fifteen dollars per week as the limit they think the employer is willing to pay for a certain class of work and bonus, premium or piece work systems will not make any difference to them so long as they have not confidence in the employer, and know the standards or rates have been made haphazard and unscientifically. The success of piece work, bonus and all other systems of wage payment hinge entirely upon the amount of confidence employer and employee have in each other, the care taken in setting standards or rates and the method of management. Under scientific management all forms of wage payment can be made successful.

T. E. G.

Rome, N. Y., February 13, 1913.

ELECTROLYTIC DEPOSITS

To the Editor of The Metal Industry:

I have read with unusual interest Dr. Watts' admirable article on "Factors Influencing the Nature of Electrolytic Deposits," appearing in The Metal Industry for January, 1913, and read before the National Electroplaters' Association of Chicago. The writer presents his subjects in an attractive and instructive manner, and I have no comment to make except as to one statement contained in the following quotation: "That the metal receiving the deposit is a factor of importance is illustrated by the poor

adhesion of electroplate upon aluminum and of nickel plate upon nickel. These metals seem, ordinarily, to be covered with an invisible film, probably of oxide, which prevents the perfect contact of the two metals, which is essential for good adhesion."

I refer to what Dr. Watts describes as the poor adhesion on nickel plate on nickel. I have no criticism to offer in regard to plating aluminum. It is idle to make any comparison of these two metals in this respect, as they are so widely different in physical and chemical properties. That nickel may be deposited on nickel with the same good results that it is deposited on steel and brass may not be generally known, but it is a fact that it is done in many shops on the most difficult work requiring the severest tests. When nickel is deposited on nickel in the proper manner it will stand the same physical tests that may be given to deposits produced on steel and brass.

The statement that nickel may not be deposited on nickel in an adherent condition should not be allowed to go unchallenged before any meeting of the National Electroplaters' Association. I beg to refer Dr. Watts and all those interested to my article on the "Deposition of Nickel on Nickel," published in THE METAL INDUSTRY for September, 1912.

EMMANUEL BLASSETT, JR.

Burlington, Vermont, February 16, 1913.

NEW NICKEL PLATING SALTS

TO THE EDITOR OF THE METAL INDUSTRY:

As a reader of your paper I have noticed quite a number of advertisements lately relating to the new nickel salts that are being placed in the market. For instance, in your February number there are notices of the products handled by Adolph Neubeck, R. F. Lang, B. O. Bowers Company, and today I am in receipt of a letter and pamphlet from Finkel, Hachmeister and Company, discribing a German product which they claim surpasses any salt on the market. It might not be any better than the salt we are using, as was the case with the "Red Copper Compound" which they advertised a few years ago and which we found to be no better than the copper carbonate we used at the time, and which we still prefer to use after giving their product a fair trial.

Being unfamiliar with these salts, I should be pleased if you could advise me regarding same. If they are superior to salts we are using at the present time, no doubt we will have to use them, but if they do not accomplish all that is claimed for them we should be unwilling to use them, especially as the price is quite high.

LAKE CITY PLATING WORKS.
By J. NELSON.

Chicago, February 24, 1913.

Judging from the reports that we see and hear there are numbers of platers who have tried and are trying out all of these various compounds mentioned by our correspondent. We know that some have had very good results while others may have encountered difficulties. This would be a good time for each to tell of his experiences. The good reports will help our correspondent and the manufacturers, while the unfavorable ones may offer opportunities for explanations and the righting of misunderstandings. The METAL INDUSTRY would like to hear from both sides of the question and invites replies from both manufacturer and plater.—Ed.

TIN SUBSTITUTE

TO THE EDITOR OF THE METAL INDUSTRY:

In a recent issue of your paper you brought up the question of using a substitute for tin. We presume that you are aware of the fact that certain manufacturers of composition or bronze mixtures are using antimony to replace a part of the tin required, with good results. According to a reliable authority, the following is an example of one of the mixtures used:

Copper	85 pounds
Zinc	10 "
Tin	1.25 "
Antimony	1.25 "
Lead	2.50 "

The antimony is used for the ordinary bronzes where the strength is not particularly important. In the above mixture the antimony replaces 50 per cent. of the tin ordinarily required in that work.

C. W. LEAVITT & CO.

New York, March 3, 1913.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

BEARING

Q.—Can you tell us what metal to put on a steel shaft that will work and wear well on a plastic bronze bearing? The machine is to be used as a dough mixer, and the covering for the steel shaft is to keep the dough from coming in contact with the steel, thus causing it to rust and contaminate the dough.

A.—Nickel-steel that contains 33 per cent. nickel is not supposed to rust and ought to work and wear well on a plastic bronze bearing.—J. L. J.

CASTING

Q.—Please tell us how to overcome porous gun metal castings, as we are constantly having trouble. Even with a mixture of 88-10-2 we have had bad results.

A.—Porous gun metal castings are generally due to the metal being burned during the process of melting. In many cases, however, bad castings result from a coarser structure due to poor feeding. By proper gating, and in the case of some patterns, by the use of chills, the porous areas are removed. Such alloys are improved by a second melting. —J. L. J.

COLORING

Q.—What is the best method of producing steel bronze coloring on brass spinnings?

A.—The following formula will produce a steel bronze color upon brass. The surface should be as clean as for plating before immersing in the dip, and may be previously acid dipped or polished as desired:

Water	10 gallons.
Muriatic acid	1 quart.
Powdered white arsenic	1 to 2 ounces.

To prepare dissolve the arsenic in one-half pint of the acid by the aid of heat, then mix with the balance of the acid and water. Use at a temperature of 160 degrees. If you desire a darker tone add one-quarter ounce of sulphuret of potassium to the ten gallons of solution. Immerse only for a few seconds, as too long an immersion may redissolve the deposit.—C. H. P.

DEPOSITING

Q.—I am sending you a writing pen, which has a very fine plate with a high lustre, and would like to know how to obtain this finish.

A.—From experiments made with the brass pen it appears to us that the finish is a white bronze, consisting of copper and tin; the proportions would probably be fifty per cent. of each. In preparing such a solution it would be advisable to use cyanide of potassium, cyanide of copper and chloride of tin. A solution of 3 to 4 degrees Baumé and nearly boiling would appear to us to give the best results, with a voltage of 3 to 4. Use anodes of block tin and copper. This deposit gives a non-tarnishable one unacted upon by hydrochloric acid. You would have to

determine by experiment if you could color the pens in bulk. Your sample was very thinly coated, showing that it was not more than a flash deposit and was made of a copper alloy instead of steel.—C. H. P.

DIPPING

Q.—Is there a cold silver dip for German silver to prevent the latter form tarnishing?

A.—There would be no advantage in silvering German silver to prevent tarnishing, as the silver would tarnish more rapidly than the German silver. A cold silver dip can be prepared as follows: Dissolve sodium sulphate in water until 30 degrees Baumé is reached, then dissolve nitrate of silver in warm water to produce a concentrated solution. Now add as much of this solution to the sodium sulphate as it will absorb; then test with blue litmus paper. If the solution does not show very faintly acid sodium bisulphite may be added until the blue litmus shows a very faint pink tone. The solution is run cold and when properly prepared, gives a fine white color. Strengthen with nitrate of silver as required.—C. H. P.

DRILLING

Q.—What is the best method and lubricant to use in drilling holes in porcelain lavatories for fixtures?

A.—For drilling holes the diameter of ½ inch, take a flat drill two lipped, hold same in a brace or dill press where possible and drill where required. The main point to be observed is to keep the drill, and the place to be cut well soaked with turpentine while cutting; this prevents the porcelain cracking and also causes the drill to bite. Use a little pressure at first, but do not work or crowd the drill too fast. For holes ½ inch and upwards procure a piece of seamless brass tube the desired size of hole you want to drill, plug one end with wood so same can be held in a drill press or machine. In the other end of the tube cut four slits ½ x 1/6 inch at equal distances apart. Now place the porcelain lavatory on table of drill, press around the place to be cut, make a ridge of putty ½ inch high, into this pour some fine sand and water, lower the drill into this with a gentle pressure and work at a very high speed. This will cut perfect holes in any thickness of china or porcelain.—P. W. B.

FINISHING

Q.—Please give me a formula for a brass solution that will plate on "lemon brass" a gold color like sample.

A.—Your sample appears to be plated with McKinley gold. This finish is used extensively upon buckles, clock frames or wherever a gold finish is required without the use of gold. The following formula is used successfully:

Cyanide of potassium	2 pounds.
Carbonate of copper	2 "
Chloride of zinc	3 ounces.
Chloride of nickel	2 "
Aqua ammonia	½ ounce
Arsenic in powder form	⅛ "
Water	5 gallons.

Use at a temperature of 180 degrees with yellow brass anodes. To prepare the solution dissolve the cyanide in slightly warm water; then add the copper, zinc and nickel salts. Dissolve the arsenic in the ammonia and finally add the balance of the water to make up the required amount. This solution should only be used to produce light deposits as in gilding. The base metal of your sample was low brass previous to coloring.—C. H. P.

GILDING

Q.—Can you give me a gold dip for small articles, such as pocket knife handles?

A.—For gilding small articles by boiling the following formula gives good results:

Cyanide of potassium	2 pounds.
Chloride of gold	10 pennyweights.
Sal soda	2 pounds.
Water	5 gallons.

Use at the boiling point and maintain the color by additions of chloride of gold. Articles other than brass or bronze should be brass plated previous to gilding.—C. H. P.

OXIDIZING

Q.—Can you tell me how to oxidize silver articles, such as toilet ware, without using the sulphide of potassium dip or the platinum mixtures?

A.—Dissolve as much white arsenic in muriatic acid by the aid of heat as the acid will absorb; then add a small amount of sulphate of copper until the solution becomes perceptibly green, then dilute one-third with water. The solution should be used warm for immersion; and if it is to be painted on, should be heated lightly over a Bunsen flame. This gives a good gray tone; the sulphuret is slightly darker. If you produce a concentrated solution of sulphuret of potassium and paint the articles with the mixture and heat over a Bunsen flame for a moment, you will find the results very satisfactory.—C. H. P.

PICKLING

Q.—What acid is best for pickling stove plates and steel bands before plating? Also what is the best acid to take the tarnish off copper sheets before plating?

A.—Muriatic acid is almost universally used as the final pickle after polishing and scouring for iron and steel goods. The strength may vary from a ten per cent. solution to one of full strength, but it is customary to use a 25 per cent. solution. To quickly reduce the oxide from badly tarnished copper sheets, a five per cent. solution of the same acid will give excellent results. The pickle may be used before and after scouring if desired. The acid softens the surface and the scouring becomes an easier operation.—C. H. P.

PLATING

Q.—Please publish the most suitable formula for nickel plating cast iron and also the voltage required for same.

A.—The following formula gives excellent results in plating cast iron:

Water	1 gal.
Double nickel salts	8 ozs.
Single nickel salts	1 oz.
Sal ammoniac	2 ozs.
Boracic acid	1 oz.

A dynamo of 4 volts and 500 ampere capacity should be ample for your purpose.—C. H. P.

Q.—I have taken up the matter of brass or copper plating on aluminum with several platers but none of them seem to be able to do this without peeling. Can you give me the proper formula?

A.—If you prepare a solution consisting of:

Sulphate of copper	1½ lbs.
Sulphuric acid	2 ozs.
Black molasses	¼ oz.
Water	1 gal.

and use at a voltage of 1½ you should obtain a good deposit, provided you use the following method in cleaning: Remove oil or grease with benzine or gasoline; then immerse the articles in a hot soda solution; rewash and immerse in a five per cent. solution of hydrofluoric acid. Shake the acid well from the articles and immerse directly in the copper bath. This method should prevent oxidization of the aluminum surface, which prevents a successful deposit. Use wooden barrels for the hydrofluoric acid, or line with lead or asphaltum.—C. H. P.

Q.—Would you kindly give me the following information: (1) How much arsenious acid is necessary to brighten a 300-gallon brass bath? (2) A formula for the verde antique finish? (3) How is a good olive green produced on a brass surface? (4) Is there not a method of plating a green effect on copper or brass by the electric current? (5) How much

sulphuric acid added to a 20-gallon nickel solution would be necessary to make a decided effect on the hydrometer?

A.—Arsenious acid does not come already prepared to add to the solution, but comes in powdered form, and for additions to the brass bath should be dissolved by the aid of caustic potash or soda. Four ounces of each in a pint of water makes a good strong solution. The amount of brightener to add can only be determined by the condition of the deposit, two to four ounces of the mixture, as above prepared, should be sufficient for a 300-gallon bath.

(2)—For a verde green finish the following formula gives good results:

Warm Water	1 gal.
Sulphate of Zinc	8 ozs.
Sal Ammoniac	4 ozs.
Sulphate of Copper	2 ozs.
Glycerine	½ oz.

The articles should be first copper plated and lightly oxidized with a liver of sulphur dip (one ounce or more to each gallon of water), then washed and immersed in the verde dip for a few seconds, then hung up to dry. When nearly dry, the surface should be stippled with a round paint brush to produce the variegated effect. The articles are afterwards lacquered and waxed.

(3)—To produce an olive green surface upon brass dissolve carbonate of copper in muriatic acid, adding as much of the copper as the acid will absorb. Then apply to the brass with a brush or by immersion. The olive green is produced at once. Wash the articles in water, then dry and rub down with a canton flannel wheel. Afterwards wax or lacquer the surface.

(4)—Various tones in green can be produced upon copper and brass by depositing upon their surface in a solution consisting of bichromate of potash and sulphate of copper, using carbon anodes. Six ounces of the bichromate and two ounces of copper to each gallon of water should give good results. The colors vary according to the length of time the articles remain in the bath.

(5)—Eight ounces of sulphuric acid added to a 20-gallon nickel bath will raise the density approximately one-quarter of one degree.—C. H. P.

SILVERING

Q.—Please give me a cheap method of silvering antimonial lead novelties. We are having trouble with same turning yellow before we can lacquer them.

A.—Polish the articles either by sand buffing or cutting with white composition; then cleanse preferably by washing first in benzine or gasoline; then the usual potash and cyanide dips. Then plate for a few minutes in a warm cyanide of copper bath and then nickel plate in a regular bath for ten or fifteen minutes. Remove, wash in water and re-copper plate for a few seconds to cover over the nickel. Now rewash in water and immerse for a second in a mercury dip, consisting of oxide of mercury, ¼ ounce; cyanide of potassium 6 ounces and water one gallon. Then plate in the regular silver bath, which should contain from two to four grains of bisulphide of carbon per gallon. The carbon should be previously dissolved in a small amount of the silver solution, to which is added a few ounces of cyanide, depending upon the amount of carbon solution prepared. This should overcome your trouble of yellow tones, as the nickel prevents the silver from being acted upon by the antimonial lead. If a dip silvering method is used the same operations may be followed, excepting that a warm silver dip should be used.—C. H. P.

STRIPPING

Q.—We use a lot of Straits tin in tinning knives, forks and spoons, and a great deal of the ware is turned into the packing room in such condition that it cannot be sold for any purpose.

Will you kindly publish a formula for stripping the tin from the solder; also can this tin be used again for tinning or manufacturing solder?

A.—Considerable difficulty is experienced in recovering tin from articles upon a satisfactory financial basis. As your class of goods probably contains more tin upon the surface than the usual sheet iron tinned, it might be a paying proposition to recover the same. The following method may be used: Prepare in an iron tank a solution of caustic soda, using from one-half pound upward per gallon of water. The solution should be maintained near the boiling point. The articles from which the tin is to be removed should be placed in a revolving iron drum, with heavy iron wire mesh for the cylinder and heavy sheet iron ends with facilities for filling and emptying the drum. This drum should be arranged upon a shaft so it can be rotated in the solution slowly, and the position of the articles may be constantly changed, enabling the solution to dissolve the tin evenly from the surface. The tin dissolved in the solution forms tin hydrate, and may be recovered as metallic tin by using the bath as an electroplating bath, and worked by the current as for plating. The anodes should consist of sheet iron and the cathodes of the same material. The tin can afterwards be melted from the sheet iron cathode.

Another method frequently used is to reduce the tin from the iron with muriatic acid. This would have to be done in lead lined or earthenware tanks. When a concentrated chloride of tin solution is produced the tin is thrown out of the solution in a pulverized metallic form. The pulverent tin could be washed and dried and remelted for use again, or in preparing solder mixtures.—C. H. P.

TEMPERING

Q.—We are having some trouble with lead sticking to sickle blades we are tempering. How can we prevent or remove it, as tumbling does not do it?

A.—Use a mixture of yellow ochre mixed with water to a thin paint-like consistency and coat the blades, using a brush. The surface should be dry before immersion in the lead for tempering. Or the blades may be immersed in a solution of potassium or sodium silicate (water glass). If the fluid should be too thick for use, dilute with water. Either method should overcome your trouble.—C. H. P.

THREADING

Q.—We are having considerable trouble with our threading chasers, using geometrie self-opening die head and chasers on brass. They make the first two or three threads or taper.

A.—Often after chasers have been reground the cutting edge of the chasers are sharp; this causes them to run ahead too fast, shaving the first few threads until the chasers get onto the work, giving the appearance of a taper thread, which, in fact it is. This is due, however, to shaving two or three threads thin which can easily be noticed by examination. By taking an oil stone with a bevel of 60°, and honing the sharp edge off it will prevent the chasers from running onto the work so fast, and consequently will hold the lead better, overcoming the shaving or cutting of thin or so called taper threads. Honing is the best method, and will overcome this trouble. The chasers should not be run until they are too dull, as it takes considerable grinding to bring same to a sharp cutting edge, and they have a tendency every time to strip thread.—P. W. B.

TINNING

Q.—Kindly tell me how to tin the bearings of a motor cylinder. The lower bearing is made on the cast iron cylinder and it heated in order to clean it with acid after it is machined. Then I try to tin it, but the tin will not stick to the iron. The cylinder is too heavy to handle for coppering and when the motor runs awhile, the babbitt comes loose.

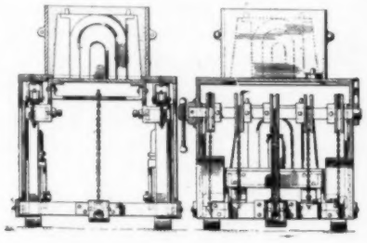
A.—Cast iron contains graphite which prevents a good job of tinning. The graphite is best removed by a thorough sand blasting. Then clean, apply soldering acid (zinc chloride) with a swab, heat and tin with a stick of half and half solder.—J. L. J.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

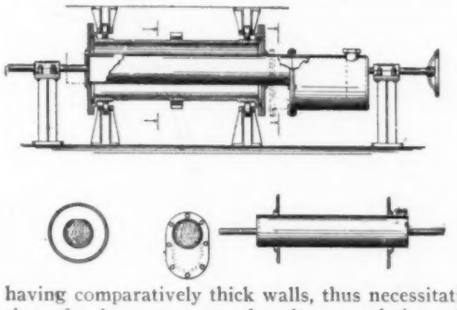
1,048,290. December 24, 1912. **Molding Machine.** Perry Brown, Coranopolis, Pa.

This invention relates to certain improvements in molding machines and more particularly in the machine for forming the mold in the flask, and the object of the invention is to construct a machine wherein the pattern plate is suspended by chains as shown in cut (or equivalent means) at its four corners, and which is at the same time guided in its movement and held from lateral displacement, a fifth chain being employed, to pull the pattern plate downward as the suspending chains are released. The chains or equivalent devices are preferably carried by pulleys of uniform size fixed to an operating shaft, and the pulleys are of such size that it takes only one revolution, or a little less, of said operating shaft to move said pattern plate from its extreme upper position to its lowermost position.



1,647,972. December 24, 1912. **Device for Filling Centrifugal Casting Machines.** W. H. Millspaugh, Sandusky, O.

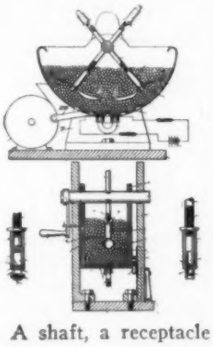
The object of the invention is to provide a device for holding a large supply of molten metal in a position to be quickly dumped into a centrifugal casting machine, as shown in cut, in which the resulting casting is to be of small internal diameter but having comparatively thick walls, thus necessitating the introduction of a large amount of molten metal through a feed pipe or trough of comparatively small diameter.



This machine is designed to afford facilities for making seamless tubes of copper and brass by centrifugal motion. This marks a great advance in the manufacture of seamless tubing as it offers a great reduction in production costs.

1,050,534. January 14, 1913. **Burnishing Machine.** C. H. Hart, Hartford, and G. B. Stretch, Meriden, Conn.

This invention relates more especially to that class of devices employed for burnishing silverware and an object of the invention, among others, is to provide a machine of this class in which the burnishing operation may be performed in an extremely effective and expeditious manner. The apparatus shown in cut is covered, among others, by the following claims:

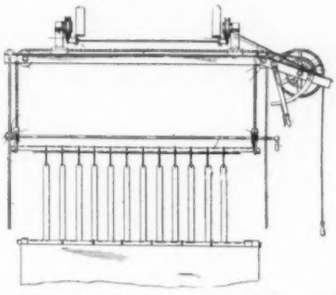


A receptacle, balls in the receptacle, means for supporting an article to be burnished in the receptacle, means for imparting movement to the holder and balls, one with respect to the other, and means for supplying magnetic force to the balls.

A shaft, a receptacle suspended from the shaft and having a curved bottom, balls located in said receptacle; a holder projecting into the receptacle, means for securing an article in the holder, means for retaining the shaft against movement, and means for vibrating the holder on said shaft.

1,049,839. January 7, 1913. **Appliance for Electroplating Plants.** J. A. Fraser, Benton Harbor, Mich.

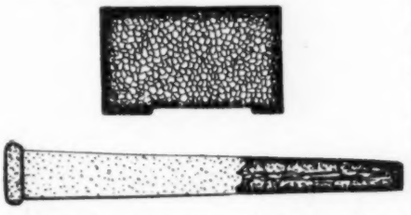
The invention relates to electroplating plants, and particularly to the means, as shown in cut, for transferring from tank to tank rods carrying the articles being treated; its object being to provide means whereby the operations of an electroplating establishment may be simplified and expedited.



The inventor claims: In combination, a frame, a shaft mounted on the frame, means for turning the shaft, a pair of drums on the shaft, one thereof being loosely mounted on the shaft, clutch mechanism for fixing the loose drum to the shaft and being engageable with the drum to lock the drum against rotation when released from the shaft, a pair of cables on each drum, two pairs of sheaves for carrying the cables, the members of each pair being located at opposite ends of the frame, rod grips attached to the ends of the several cables, releasing means for each grip, a controlling rod common to the releasing means of each pair of grips, and a brake for locking the shaft against rotation.

1,052,156. February 4, 1913. **Metallic Coating for Metallic Articles.** H. J. Lohmann, Jersey City, N. J. Assignor to the Lohmann Company, of New York, N. Y.

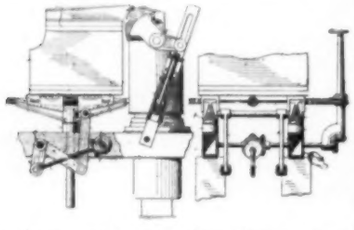
The present invention relates to a means, as shown in cut, for preventing the corrosion of metallic articles, especially those made of iron or steel, and such means consists of a lead coating permeating the substance of the article to a measurable depth and having a strong chemical union therewith, so as to prevent the penetration of the atmosphere and the resultant oxidation of the article. The most common means used for protecting iron and steel articles is the process of so-called "galvanizing" with zinc; but the susceptibility of zinc to corrosion by atmospheric influences, and especially by sulfurous or sulfuric acid fumes and vapors, and by sea air or sea water, is well known. Zinc is also a brittle metal, which possesses only a surface adhesion with the article, and sheet-metal coated with it cannot therefore be worked into forms where the metal is abruptly bent, without cracking the coating and exposing the sheet to oxidation.



The present invention substitutes a coating of lead alone or with a slight admixture of tin, for the zinc coating heretofore used. It is well known that lead presents a great resistance to sulfurous and other corrosive fumes, and that it is entirely flexible, so that sheet-metal articles coated therewith may be bent without cracking the coating; but lead alone has not usually been substituted for zinc as a coating, because it has no affinity for iron and the means employed for attaching the zinc coating will not attach the lead coating satisfactorily.

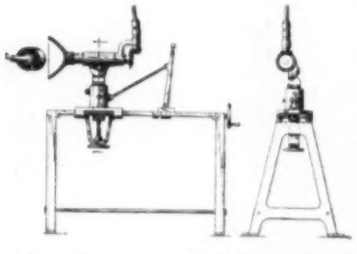
1,050,293. January 14, 1913. **Equalizing Support for Molders' Flasks.** John T. Ramsden, Philadelphia, Pa. Assignor to the Tabor Manufacturing Company of Philadelphia, Pa.

The principal object of the present invention is to provide simple and efficient means, as shown in cut, for holding or supporting the bottom board, flask and sand mold in proper relation to the pattern and pattern board after they have been rolled over into position for withdrawing the pattern so that the bottom board, flask and sand mold are held in fixed lateral relation to the pattern, pattern board and their guides while the pattern is drawn and thus insure as far as possible a clean, unbroken edge at the sand mold; to compensate in the support for irregularities in or distortions of the pattern board, flask and bottom board, such as are due to heat, moisture and rough handling and which would cause the bottom board to present an uneven surface or base upon which to support the mold, thus making it difficult to keep the surface of the mold in contact with the surface of the pattern board; and to facilitate and improve the operation of the wedges which support the bottom board, flask and sand mold as well as the means by which these wedges are operated.



1,052,110. February 4, 1913. **Buffing Machine.** Harry J. Webb, Detroit, Mich.

This invention relates to improvements in buffing machines and its object is to provide a simple construction having a universal adjustment and provided with simple means for moving the work into and out of engagement with the buffing wheel; and to provide certain other new and useful features in the construction and arrangement of parts. The machine, shown in cut, is covered by the following claim: In a buffing machine, the combination of a support, a head reciprocable upon said support, means for reciprocating said head, a vertically adjustable member on the head, a bearing member pivotally attached to said vertically adjustable member, a mandrel in said bearing member having a projecting end for the attachment of work thereto to rotate therewith, and means for transmitting motion to the opposite end of said mandrel to turn the same comprising a shaft and a universal joint connection.



1,052,761. February 11, 1913. **Means for Soldering Aluminum.** C. E. Steinway, Lüdenscheid, Germany.

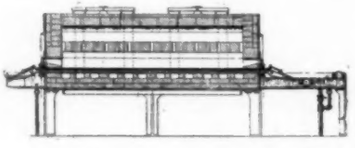
This invention relates to means for soldering aluminum, consisting in a soldering stick to be used in connection with the soldering of aluminum, as shown in cut. The object of the invention is to provide a soldering stick simple in form and manufacture and of easy application.

In carrying out the invention solder is used consisting of pure aluminum or a rich aluminum alloy in connection with a flux capable of dissolving oxid of aluminum consisting of a composition of elements of different melting and volatilizing points and by melting such flux by indirect heating preferably in a metal receptacle which in a preferred embodiment of the invention is formed by the soldering metal itself.

Therefore the invention consists in a soldering stick, the soldering metal of which contains a high percentage of aluminum in the form of an aluminum oxid dissolving flux mixture in metallic inclosure, said mixture comprising components of different melting and volatilizing points. In connection herewith it is to be understood that by rich aluminum alloy, as this term is used here, an alloy which contains more than 75 per cent. of aluminum is meant.

1,052,574. February 11, 1913. **Non-Oxidizing Annealing Furnace.** C. S. Davis, Jersey City, N. J. Assignor to Rockwell Furnace Company, New York.

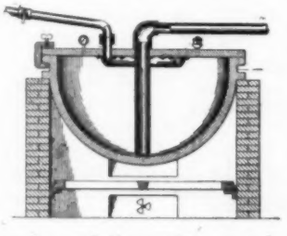
The furnace is designed particularly for treating wire and strip material. The main object of the invention is to prevent oxidation of the objects under treatment. This object is preferably achieved by providing the furnace with an annealing chamber, as shown in cut, which is closed to the heat products in the furnace and which is likewise closed against the entrance of any air or gas from outside the furnace.



In its preferred form the annealing chamber is in the shape of a continuous tubular member which extends the full length of the furnace and is provided with end extensions projecting beyond the ends of the furnace. The material or objects under treatment is fed into the annealing chamber through the end extensions thereof and as a means of sealing the ends of the chamber. A sealing medium is preferably supported in sealing engagement with the ends of the annealing chamber. For this reason the ends of the annealing chamber are preferably inclined downwardly so as to dip into suitable tanks located at the ends of the furnace.

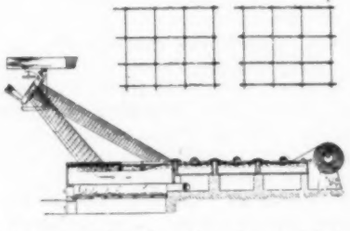
1,053,948. February 18, 1913. **Process of and Apparatus for Delivering Molten Metal.** Greenville Miller, Summit, N. J.

According to this invention molten metal contained in a closed melting pot is ejected and delivered, for example, to an ingot mold, by subjecting the surface of the metal to the direct pressure of steam. The steam is preferably generated within the pot, by supplying water to a vaporizing chamber in the upper part of the pot, some of the water also being permitted to run down in fine streams onto the surface of the molten metal, where it vaporizes. Suitable apparatus for carrying out the invention is shown in the accompanying drawings.



1,053,664. February 18, 1913. **Method of Galvanizing or Coating Fence and Other Fabrics.** W. H. Sommer, Peoria, Ill.

This invention has reference to the galvanizing or coating of wire products, such as fence fabrics or nettings, after weaving, and also to the coating of various other kinds of fabrics. One of the objects of the present invention is to provide a practical method, as shown in cut, of galvanizing or coating, light and heavy fabrics, preferably wire fence fabrics, comprising longitudinal running or strand wires and transverse stays or picket wires, after weaving.



The invention has for its further object to galvanize or coat open-mesh wire fences, fence fabrics, poultry fences and light nettings, formed of a series of running wires extending longitudinally of the article and a series of cross-wires connecting said running wires, by immersing the article in a suitable molten metal bath, preferably zinc, and turning the article at a given point in the bath, along a line diagonal to the plane of its traverse.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW MOULDING MACHINE FOR FLAT WORK

The moulding of flat work, more specially of round or oval, and those of rather large dimensions, which are composed of several parts, such as stove plate work, ornamental work, balconies, crosses, etc., offer difficulties of a special character. The necessity to abolish almost entirely the chipping of the castings to get a perfect match of the two half moulds, also the speed of well studied hand moulding, has rendered practical and economical machine moulding of such castings exceedingly difficult. Hand moulding, with men properly trained and equipped, gives a sufficient output to render machine moulding, in many cases, unnecessary, especially if the work turned out by the machine is not as perfect as the work made by hand. This is the reason why the manufacturing of small round work has never been made economically on the machine.

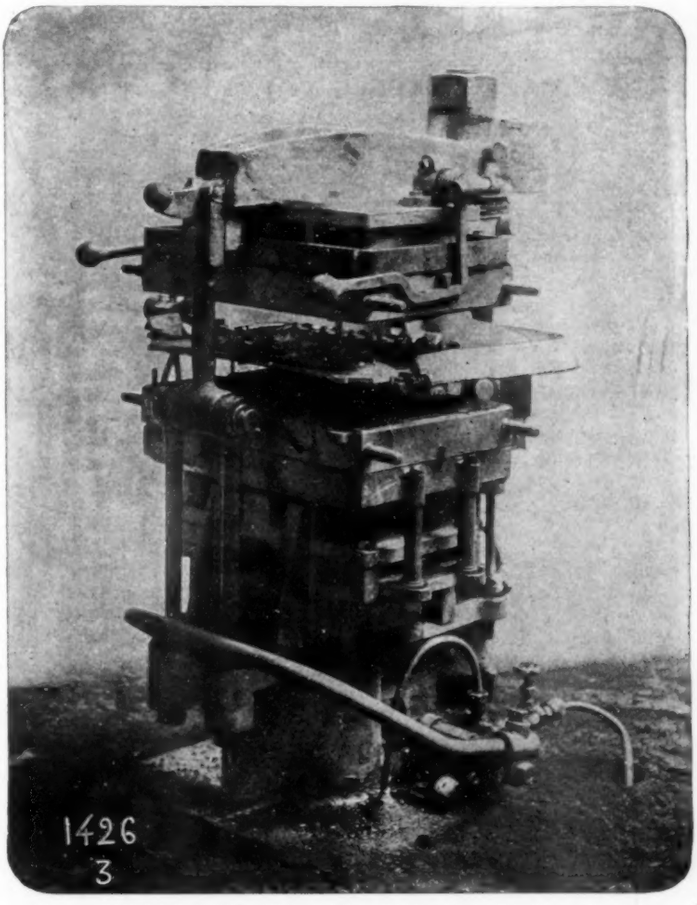


FIG. 1. SETTING THE MOULD READY FOR USE ON THE HYDRAULIC MACHINE FOR FLAT WORK.

It is in order to meet these requirements that a foreign firm has been studying the problem of the machine moulding for many years and have put on the market a device described below and which answers the following requirements:

First. To fill simultaneously the two boxes, the drag being placed joint up on a sand filler, which is supported in equilibrium by a small pressure and the cope being placed joint down on a double-faced pattern plate, swung on the side of the machine. The plate is simply laid down on a bracket, which, at the right moment, can bring it into position, without fastening, so as to leave it free to follow the motion of the boxes. (See Fig. 1.)

Second. To ram simultaneously the two boxes at one stroke.

Third. To draw the pattern by power while the plate vibrates.

Fourth. To close the mould on the machine and to either pour on flat or end.

Fifth. To use barred boxes, which presents great advantages either for pouring on flat or on end.

The pattern plates are, in most cases, made of white metal by simple and careful moulding in special boxes which are afterwards spaced by a suitable frame which constitutes a chill for edges and a spacing gauge to obtain a certain thickness for the plate. This very old process of plate making has been practiced in Scotland for over a century, but was not, up to the present time, adapted for the simultaneous moulding of cope and drag. Below we give a short description of a machine which successfully solves the problem:

This machine consists of a frame which is bored in its centre, making the ramming cylinder. This cylinder is prolonged by another cylinder, which is to receive another smaller piston, which is intended for executing quickly all preliminary motions, whilst the large piston is intended to do the ramming of the sand. The large piston is bored so as to receive another smaller one, which supports at its end a plate on which is fixed the lower sand frame. This piston and the piece which supports same, are placed in equilibrium by water or air pressure.

On the side of the machine is placed a column, around which swings, on the left, the support for the pattern plate and on the right, the cross-beam, which can be hooked to the main frame of the machine, Fig. 1. The support of the pattern plate is placed so that this later can go up, through the action of the cope, the moulding box not touching the support of the pattern plate. Below is a short description of the working.

The cross-beam being put on the right, and the pattern plate, together with its support, on the left, the men place simultaneously their moulding boxes in their place, one on the lower sand frame and the other on the pattern plate, Fig. 1, filling them with sand. Then, simultaneously, the men bring respectively the axle of the machine, the pattern plate together with its moulding box full of sand, the other, the cross beam, which he blockades.

As soon as the cross-beam is blockaded, the men start the distributor, so that only the smaller piston received water, the whole equipment is lifted quickly, the drag taking on its way the pattern plate, and causing it to lift together with its moulding box, until the whole meets the upper ramming plate, all the surfaces being in contact (sand-ramming plates—pattern plate, etc.). During the lifting motion, the large cylinder has become full of water, this coming from the tank.

The men then press upon the lever of the distributor, which causes the water under pressure to flow into the large cylinder, already filled with water at low pressure. By this means ramming is obtained—the upper moulding box being hooked to the head (see Fig. 2)—the distributor is put to exhaust and at the same time the vibrator is started, the drag going down together with the pattern plate, and the drawing off of this moulding is then made; the motion of the moulding box is continuing, the pattern plate is stopped on its way by its support, and the drag, continuing its downward motion, operates, by so doing, its own drawing off.

After this is done, the pattern plate is swung out whilst the small pressure is applied again so as to bring together the moulding box, by means of the small piston alone. The locking of both half boxes is done by the hooks, and at the same time the upper moulding box is being unhooked from the support. With well-trained men, it is claimed, one mould of easy castings, to be cast

on end, can easily be obtained in 45 seconds. This work, it is said, can be still done quicker, if the machine is fitted with the device to mechanically feed it with sand, as the longer and harder operation is to fill the moulding boxes with sand. The above described machine is built by Messrs. P. H. Bonvillain and E. Ronceray, of Paris, France.

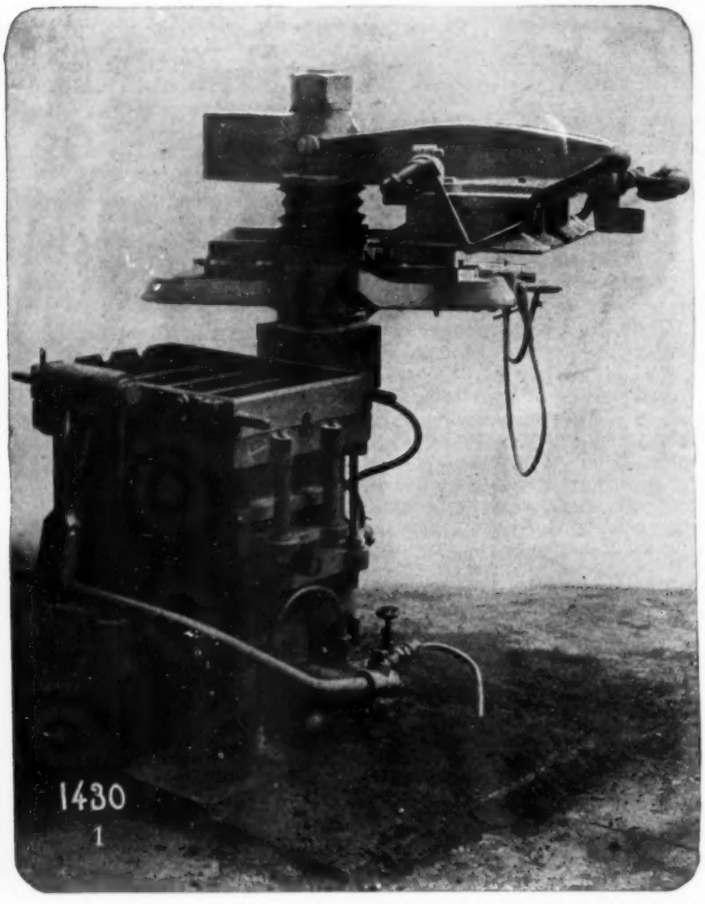
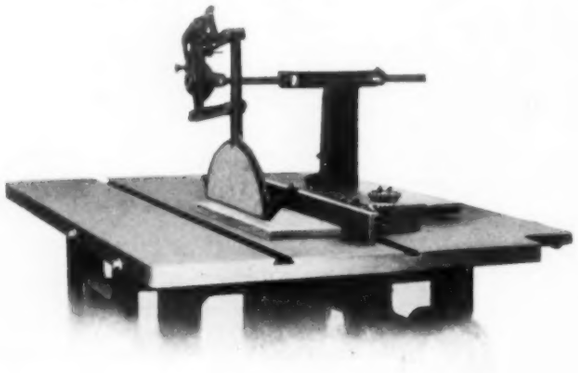


FIG. 2. STARTING THE MOULD IN THE HYDRAULIC MACHINE.

CIRCULAR SAW GUARD

The P. Pryibil Machine Company, 514 W. 41st. street, New York, state that the circular saw guard, shown in the cut, is entirely different from any other device of that character. They give the following claims why this latest Phyibil circular saw guard is the best and most reliable device made which protects employees from accident:



PRYIBIL SAW GUARD.

FIRST.—It prevents possible accident by the striking of an unexpected obstruction.

SECOND.—It retains original sawing space.

THIRD.—It allows its use on tilted as well as level saw tables.

FOURTH.—Its principal features are balanced double links for raising the protecting hood parallel to the table.

The general description of the guard is as follows:

SAWING SPACE.—The guard is supported by pipes with flanges fastened to ceiling and rigidly stayed by wire ropes with turnbuckles.

BALANCING.—The hood is guided by two links which partially balance same and cause it to raise and lower easily.

ADJUSTMENT OF HOOD.—The hood is ordinarily resting on the table and is raised and lowered automatically. It can be suspended, however, at any height by a spring pin fitting into a series of holes for various adjustments.

INTERCHANGEABLE.—Each part of the guards is made of the best suitable material. Perfectly machined by means of jigs and special fixtures so that any part can be replaced at once.

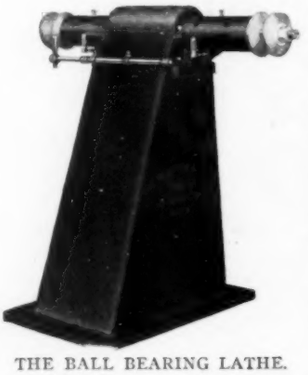
SIZES.—These guards are regularly manufactured in four sizes, which we designate as:

12	in.	guard	takes	saws	from	9	in.	to	12 in.
16	"	"	"	"	"	13	in.	to	16 in.
20	"	"	"	"	"	17	in.	to	20 in.
24	"	"	"	"	"	21	in	to	24 in.

Further information and specifications will be gladly furnished by the Pryibil Company upon application.

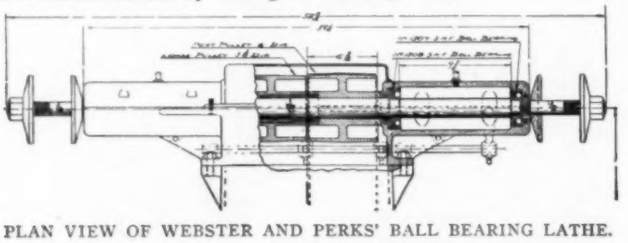
A NEW BALL BEARING POLISHING AND BUFFING LATHE

The Webster & Perks Tool Company, of Springfield, Ohio, who have been and are at present manufacturing a strictly high grade line of grinding and polishing machinery with plain babbitted bearings, have just recently also added several sizes of ball bearing polishing lathes. We illustrate herewith their largest size, or No. 6 machine equipped with (4) heavy "S. K. F." double row self-aligning ball bearings, and while illustration shows machine with belt shifter and pulley cover for belting from below through the base, this is optional, as machine may also be belted from above by removing pulley cover. The machine weighs net 650 pounds, has steel spindle 52¾ inches long over all, 1¼ inch diameter where wheels go on, 1.5748 inch diameter in bearings, 6 inch diameter 6 inch face tight and loose or 6 inch diameter x 6 inch face single tight pulley at option, height to center of spindle 40 inches, sizes of base at floor 23 inches x 31 inches.



THE BALL BEARING LATHE.

After an exhaustive test by one of the most prominent engineering laboratories in this country, this ball bearing machine, it is said, shows a saving of approximately 2 horse-power over the same size machine with plain babbitted bearings Two small sizes of ball bearing polishing lathes are also being built by this company for manufacturers having requirements for medium and light polishing and buffing. Literature and specifications of these machines will be gladly supplied upon application of the manufacturers by asking for catalogue M.



PLAN VIEW OF WEBSTER AND PERKS' BALL BEARING LATHE.

ROCKWELL, "SEMI-PRODUCER" FURNACES

To meet the demand for simple means of utilizing cheap fuel in industrial heating operations without sacrificing the quality or quantity of output or complicating the operations, the W. S. Rockwell Company of New York offers its "Semi-Producer" furnaces which, by reason of their efficient and economical use of low priced coals, afford the advantages of producer gas furnaces without the usual producer equipment. Where the price of oil prohibits its use, these furnaces offer the logical solution of the fuel question because they employ to the best advantage cheap and staple coal fuel without a complicated and extensive auxiliary equipment.

Producer gas generated from bituminous or anthracite coal and burned either as hot or cold gas has not always proven satisfactory or profitable. Hot producer gas for average heavy work usually implies large, extensive flues, which soon become tar and soot clogged, and, in any case, entail the loss of a considerable portion of the sensible heat of the gas and take up a large amount of room. Cold producer gas means that moderate temperatures only are obtainable unless regeneration or elaborate recuperation is resorted to, since all the sensible heat of the gas has been lost, a portion of the volatile gases condensed to tar and there remains only a lean gas diluted with a large and worse than useless volume of nitrogen.

In this "semi-producer" type of furnaces the generation and distribution of the hot gas to the material in the furnace is claimed to be accomplished without the loss of any sensible heat—without the condensation and consequent loss of any of the tarry gases and with little loss of heat by radiation.

FURNACE AND FUEL TO SUIT THE WORK.

The W. S. Rockwell Company says further; that the above is the rule covering the installation of all their furnace equipment, and they recommend the "semi-producer" furnaces only where the nature of the work and the local conditions make them the most suitable. They are not confined to any one type of furnace nor to any one fuel and, while at times, the lowest priced fuel is not the most economical there are many classes of work which permit the use of a low priced fuel if properly applied and it is for such work that these furnaces are offered.

The object is to deal with each case on its merits, making it a point to utilize the fuel, whatever the kind, to the best advantage, and to arrange the heating chambers and openings of the furnace so that, with a good method of routing and handling the material to and from them, the total heating and labor cost will be reduced to a minimum without the sacrifice of quality. The company believe that the demand for medium and large furnace equipment may be well taken care of by these new combination furnaces and that they mark a radical step toward better and cheaper heating. The following condensed list of the advantages of this type of furnace should appeal to those who have used coal, either fired direct in gas producers or in powdered form, and also to the fuel oil user who may find his supply too costly or too difficult to obtain. The advantages include:

The efficient and economical use of bituminous or anthracite coal, the least costly and most available of all fuels.

The conversion of the solid to a gaseous fuel and the distribution of this easily handled gas in a manner not possible with ordinary coal firing, and without the complication, large loss and high cost involved in a separate hot gas equipment. Such complication, loss and cost being decidedly greater in a cold gas producer installation.

The application of the gaseous fuel in a manner that permits of its being burned just where it is needed by retarding combustion until the fuel is delivered close to the final heating zone.

The conservation of a large part of the heat in the fuel by effecting combustion close to the point of utilization; by the complement of the heat in the spent gases to preheat the air for combustion, and by decreasing radiation with thick walls and a minimum amount of exposed radiating surface.

A low maintenance cost due to the simplicity and strength of the construction and the fact that a comparatively low temperature is maintained in the gasifying chamber and gas flues—the maximum temperature being developed in the final heating chamber.

The uniformity of heating made possible by the utilization of the fuel as gas in a structure that permits of controlling the volume, temperature and composition of the gas to and from all points of the chamber.

Underfiring, the natural and correct principle of heating from the bottom up instead of from the top down, and the uniform heating of the product from all sides by radiation and reflection, thus avoiding the danger of overheating exposed parts of the charge by direct blast from flame or hot gases at high velocity. Steadiness of operation is also made possible by a fuel bed requiring only occasional replenishing.

For further particulars address the W. S. Rockwell Company, 50 Church street, New York City.

TITANIUM AS A COPPER STRENGTHENER

By Charles Vickers.*

In the manufacture of iron and steel, the value of titanium for improving the physical qualities of these metals is now unquestioned, and its reputation is so firmly established that its consumption is increasing at a very rapid pace. This is due to the powerful affinity for oxygen and nitrogen that titanium possesses, which enables it to effectually remove these deleterious gases from the bath, thus increasing the density and strength of the resulting metal.

As there was every reason to suppose that titanium would act in a similar manner, and be equally efficacious and valuable in the treatment of copper and other non-ferrous metals, as in steel and iron, Auguste J. Rossi, of the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., commenced to investigate the value of titanium in this respect, and was awarded several patents, at different times, covering the application of titanium in copper and other non-ferrous metals.

These alloys comprised titanium-copper, titanium-aluminum, titanium-nickel, titanium-zinc, etc., but so many difficulties were encountered when their manufacture was attempted on a commercial basis, that it was not until the latter part of 1912 that sufficient progress was made to enable any of them to be regularly placed upon the market.

The greatest difficulty that arose in connection with the commercial manufacture of titanic non-ferrous alloys, was due to the disparity between the melting points of titanium, and the particular non-ferrous metal with which it was to be alloyed. The intense heat of the electric arc was required to reduce and fuse the titanium, but the other metals, such as copper, would volatilize at this temperature, so it will be readily appreciated that the problem was no ordinary one and very difficult of solution. In addition to the question of the disparity of melting points, there were of course other difficulties which arose, but the last few weeks of 1912 witnessed their complete solution and titanium-copper is now a regular article of commerce destined to prove of great value to the brassfounder as it enables castings of high electrical conductivity to be produced at a nominal cost. In the field of non-ferrous metallurgy, therefore, the greatest accomplishment of the Titanium Alloy Manufacturing Company has been the successful commercial production of titanium-copper, a new and powerful deoxidizing agent of great value to the manufacturer of copper, brass, bronze and other non-ferrous castings.

*Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.

EXCEL-ALL PLATING BARREL

The Bennett-O'Connell Company, Chicago, Ill., are placing on the market their Excel-All mechanical plating barrel, which is claimed to be a radical change from any mechanical plating device that is on the market at the present time. The barrel is very simple in construction and also very simple to operate. It is rotated by means of a sheave or gear which is driven by a belt from any convenient source of power, the barrel itself being suspended on this sheave or gear and can easily be removed when a sufficient deposit has been put on the work.

One feature claimed for this barrel is, that there is more work surface exposed to the anode surface than in any other plating device on the market today. The outfit requires no special anodes, any flat anodes will do and it is said that less voltage is

required to operate than any other mechanical plating device in use at the present time. The makers guarantee the successful operation of this tank at 6 volts and guarantee to deposit from

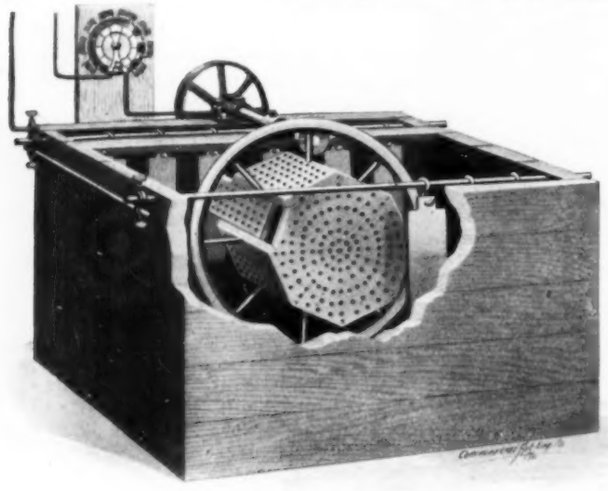


FIG. 1. EXCEL-ALL PLATING BARREL SHOWN IN OPERATION.

50 to 100 per cent. more metal in any given time than can be done with any other device for similar work.

One advantage that this barrel has, it is declared, is that the work is always in contact with the current and during one revolution the work changes position eight times, or sixteen times per minute, which insures a uniform deposit on all of the work regardless of the length of time that the same may be left in the

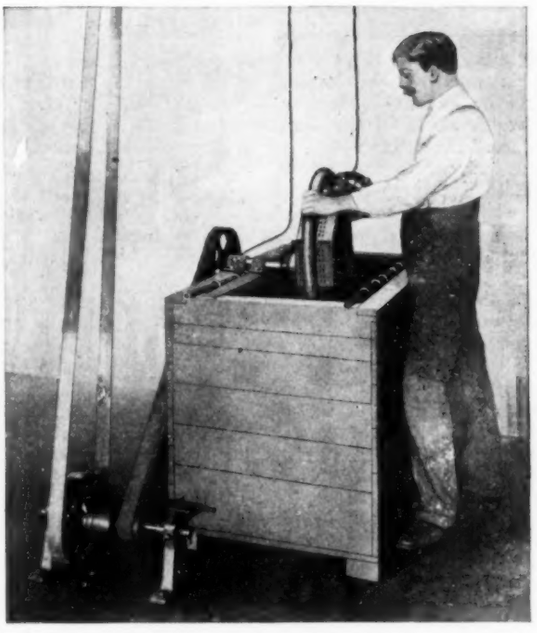


FIG. 2. REMOVING THE WORK FROM THE EXCEL-ALL PLATING BARREL.

tank. The accompanying cuts show the barrel in operation, also the method of removing the same to remove the work and placing it back in the tank again. These barrels are built in two sizes, 4 x 16 inches and 8 x 16 inches on the inside.

A MODEL CHEMICAL AND TESTING LABORATORY IN AN OFFICE BUILDING

Perhaps not many of our readers, or as many as should, know that in the heart of the business district of New York City, close to Wall street, there exists a series of laboratories for technical experimentation and testing, as well as for varied chemical analyses and research, which are located in a large office building, and which would compare as to completeness to

THE CHEMICAL LABORATORY.

THE PHYSICAL TESTING LABORATORY.

the best outfitted of educational and public testing establishments. These are the laboratories of Dr. Charles F. McKenna in the Hudson Terminal Building, 50 Church street, where they occupy the entire top floor of the four-story annex from Fulton street to Dey street.

The original chemical laboratory from which these have expanded has historic importance, as it was established fifty years ago by Dr. Gideon E. Moore, the famous chemist, whom Dr. McKenna joined in 1893. The latter has consistently striven in these twenty years to build up a great institution of practical technical value to all interests that have scientific questions of this character to answer. Materials in general, and materials of engineering in particular, are examined and tested in these laboratories, and the talent and facilities provided are such that questions of economy in foundry and factory are ably handled and promptly disposed of.

The proximity of the laboratories to the great central point of traffic has proven to be a great aid to manufacturers in all the boroughs, and in Jersey City, Hoboken, Newark, Passaic and Paterson, and by the aid of the Parcels Post, express and messenger, and lastly the telephone, all the advantages of a resident chemist are offered to even the busiest one amongst them.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

ELECTRO-PLATERS' ASSOCIATION

President, Richard H. Sliter, Jersey City, N. J.; Recording Secretary, A. J. Stremel, Brooklyn, N. Y. All correspondence should be addressed to the Secretary-Treasurer, Royal F. Clark, 246 Fulton avenue, Jersey City, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23rd street, New York, on the fourth Friday of each month, 8 p. m.

The fourth annual banquet of the National Electro-Platers Association was held at the Broadway Central Hotel, New York, on the evening of February 21, and the rapid growth of the association was indicated by the fact that there were 261 present, compared with 88 at the first banquet. A parlor was engaged in the hotel for the day and it was crowded by members and their guests, who were renewing acquaintances and inspecting the various exhibits. It was nearly 9 o'clock before the banquet started, and after President Sliter had spoken a few words of welcome the picture shown on the following page was taken, after which those present devoted their attention to the excellent menu prepared for them. After the dinner, Dr. W. App Jones, the toastmaster, made a few appropriate remarks and then introduced Dr. George F. Kunz, the gem expert and vice-president of Tiffany & Company. He spoke generally of the important part played by the electro-plater in the jewelry industry.

The next speaker was Dr. J. W. Richards, secretary of the American Electrochemical Society, who emphasized the wonderful advances that had been made in electro-plating during recent years, and urged them not to be content with their present status, but to endeavor to learn more and raise their art to a higher level. He called attention to the annual meeting of his society on April 3-5, at Atlantic City, N. J., and invited the platers to attend the Symposium of Electro-Plating which will be held on the 5th. As the Philadelphia Branch of the N. E. P. A. has extended an invitation to the members to attend their open meeting on the 4th, quite a number of the members have decided to make a two-day trip and take in both affairs.

H. B. Coho, of the United Lead Company, New York, gave a humorous and happy speech, but closed in a serious strain by urging "Co-operation" as the only means of advancement and success.

W. H. Barrows and Col. J. H. Hansjosten, presidents of the Toronto and Chicago Branches, brought the good wishes of their respective societies.

Souvenirs were presented by the following companies: The official badge, a cut of which is shown, was donated by the Trisalyt department of Roessler & Hasslacher Chemical Company; Egyptian Lacquer Mfg. Company, New York, menu cards for the dinner; Celluloid Zapon Company, New York, gilt paper cutters; Eureka Pneumatic Spray Company, New York, patented aluminum lead pencils; Adolf Neubeck, New York, cigars; the Hanson & Van Winkle Company, Newark, N. J., the music, flowers and a handsome note book and bill holder. This company also invited the platers to visit their demonstrating plant, and on Saturday morning over sixty took advantage of the opportunity. A very interesting time was experienced, after which a luncheon was served. The exhibits were as follows: Hardware finishes, by H. E. Willmore, Chicago; Ozonizer, description of which was published in the January, 1913, issue of THE METAL INDUSTRY, by G. E. Moreland, of the Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.; 25 samples of etched and plated work by W. H. Legate, of the Techno-Chemical Laboratory, Hartford, Conn., and carriers by the C. H. Lamson Company, Lowell, Mass., and others.

THE OFFICIAL BADGE.

On Saturday afternoon delegates from the New York, Chicago, Philadelphia, Rochester, Toronto, Detroit, Indianapolis and St. Louis Branches met in a convention to reorganize the society and form a new constitution, to be submitted to the branches for revision and adoption. One of the most important changes is the suggested new name: The American Electro-Platers Society.

At the banquet were:

Thos. B. Haddow, Horace H. Smith, Geo. E. Irvin, H. I. Arms, William S. Elwin, George B. Hogaboom, Clum Mace, William Fischer, John E. Sterling, John Painter, Chas. E. Dunn, J. M. Dunn, Henry Keppler, Chas. W. Bailey, Joseph C. Andrews, Gottlieb F. Lorsch, W. W. Wells, John Schultz, K. Potthoff, John Gunther, J. A. Hall, E. Schor, Hugh Baxter, C. E. Skidgell, Chas. F. Connolly, A. W. Kruer, D. Baumann, P. E. Hartmann, Frank Duffy, G. F. Haskins, C. J. Sizelove, Lou Klein, Wm. Voss, C. Chambers, Thos. F. Jordan, Rockey Massicotte, Gro. Michaelis, Arthur B. Wells, Joseph L. Dinan, H. C. Meinka, E. McGuirk, Jos. McCarty, Jos. A. Straub, Sr., Jos. A. Straub, Jr., W. G. Stratton, C. Wyotzem, L. H. O'Donnell, C. H. Corbin, Edw. P. Powell, B. L. London, B. J. Owens, Samuel R. Taylor, George Reuter, Jr., F. H. Piske, T. N. Lally, E. Mellwater, E. H. Smith, C. Roesch, J. Puritan, B. S. Ammermann, Joseph E. Smith, H. A. Gleischmann, Theodore G. Hart, Henry Miller, W. R. Bailey, P. J. Startzman, Ralph Baldwin, Roy R. Webber, William H. Betz, Fred C. Clement, Harry J. Arhmall, George W. Lees, Chas. Walker, A. W. Baurmbe, Theo. Kreuder, F. W. Matts, Jr., J. E. Hartnett, S. B. Smith, William R. Wells, W. H. Myers, W. R. Dodson, A. Schaumloeffel, W. Johnson, R. M. Vimells, George Reinheimer, C. J. Honell, H. H. Reama, George Gehling, D. Schoonmaker, C. O. Field, C. Frey, A. A. LeFort, Alfred Martin, Stanley Schubert, Frederick L. Miller, L. Lescher, Fred Gumm, J. H. Whitfield, J. C. Oberender, J. Goffrey, Robert W. Miller, J. Menges, J. Lunsmann, Edward W. T. Faint, Alfred Vauthier, D. Sellinger, Martin B. Apy, Henry Muhlbach, Chas. A. Cooper, Theo. Scherm, Aug. G. Hoffman, Frederick Koch, Charles Koch, James Leahy, John W. Demars, J. H. Wellmore, H. C. Bernard, C. Lopez, George Jennings, Harry Schmidt, Wm. Cornell, R. H. Sliter, C. Dittmar, B. Popper, Percy S. Brown, Geo. N. DeWitt, Adolf Neubeck, A. M. Grant, G. Elmer Moreland, T. A. Trumbour, G. W. Cooper, G. H. Niemeyer, Royal F. Clark, C. H. Buchanan, Wm. J. Schneider, Charles H. Proctor, John H. Loeffler, Edward M. Stephenson, J. H. Hansjosten, W. G. Barrows, W. J. Terpenny, Arthur Russell, C. W. Campbell, Fred Allen, H. C. W. Flanigan, W. A. Jones, C. A. Stiehle, C. DeBarney, W. J. Smart, J. A. George, C. W. Smart, Clarence G. Backus, C. B. Lesser, **H. D.**

Photo by Sprinkle, 51 Third Ave., N. Y.

FOURTH ANNUAL BANQUET OF THE NATIONAL ELECTRO-PLATERS ASSOCIATION, HELD AT THE BROADWAY CENTRAL HOTEL, FEBRUARY 21, 1913.

Untredt, Chas. Piske, George Roberts, J. R. Arben, A. P. Munning, S. F. Berry, F. J. Clark, L. C. Sturdevoort, C. R. Kreistead, John J. Burke, Frank Murphy, Joseph W. Richards, Harry Farrell, Arthur T. Ford, Edward Cooley, P. W. Jerran, F. F. Pertsch, H. Lublen, Wm. Blair, R. K. Fox, A. P. Sanger, S. S. Slater, E. Howbrigg, C. Fugger, G. Swamby, B. H. Stearn, A. W. Snow, R. Leonard, Walter J. Schmidt, H. R. Proctor, R. Riley, E. L. Proctor, Thomas Schmidt, H. Baum, E. Ballon, W. J. Miller, Sam Jacobs, James Phelps, Charles Coleman, E. J. Powers, W. J. McConnell, G. F. Koelble, Frederick Goertz, A. T. Steffens, F. Manther, Newton Cornell, Ed. Gumby, W. Schwenman, Harry Mohl, John Hallmann, Joseph F. Steier, Caspar Lombard, Henry Friedman, D. Bush, Wm. N. Pierce, R. R. Rowe, Gustave O. Oeckel, Fred Aytell, William Wester, Wm. Keefe, B. Schaffer, M. Rosenthal, Silas Schwerin, H. J. Brenner.

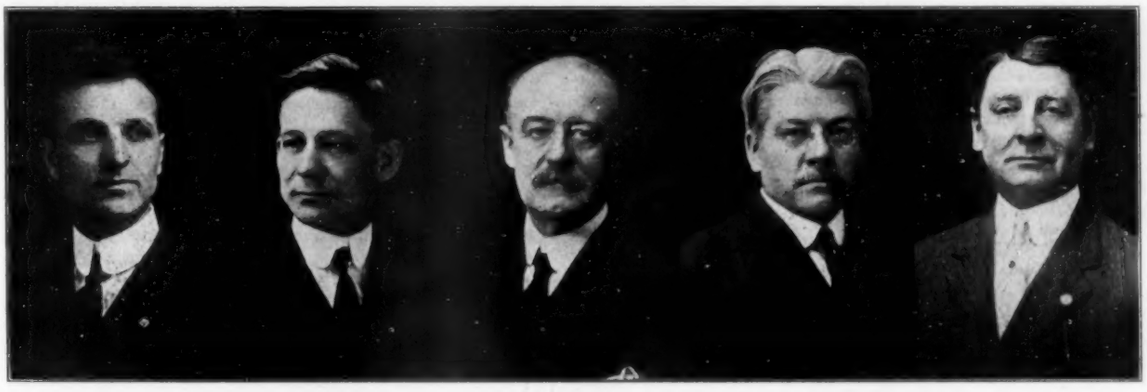
The regular monthly meeting of this association was held on Friday evening, February 28, with thirty-two members present. Six active and two associate members were elected. Some of the subjects discussed during the recess were: "Resists or Stop-offs to Be Used in Etching," "Etching Fluids," "Pierce Etching," "Jap Bronzing," and "The Advantage of Using 98% Anodes in Connection with the 'Prometheus' Nickel Bath."

The February meeting of the Philadelphia Branch was held on the 28th, and two new members were elected. The delegates to the convention gave glowing reports of the transactions of that body. The talks and experiments on chemistry will be continued each month. An open meeting will be held April 4.

PLUME AND ATWOOD MANUFACTURING COMPANY FOREMEN'S ASSOCIATION

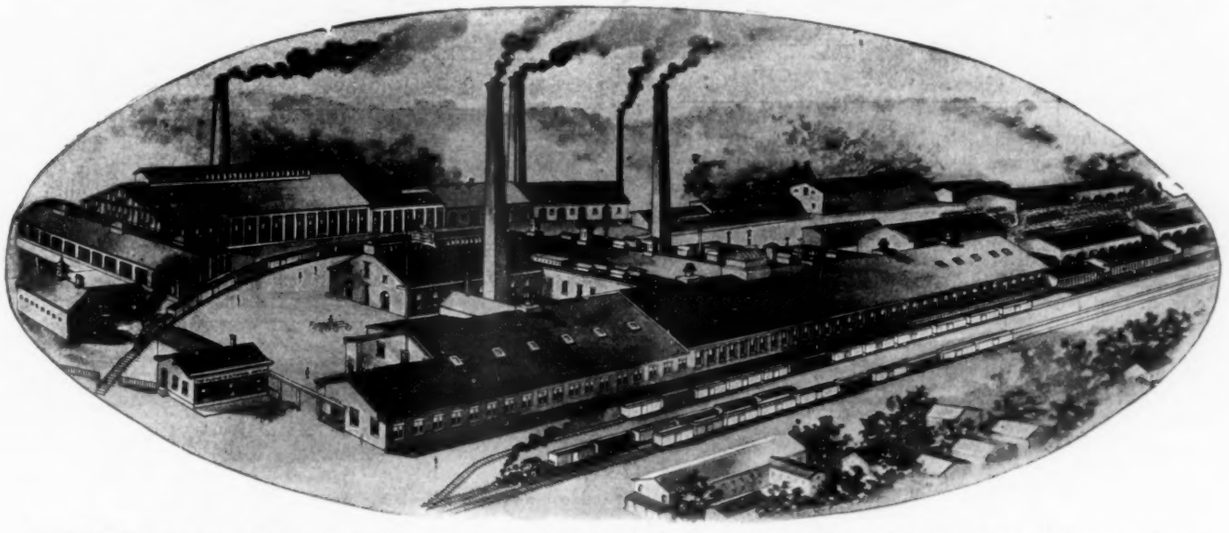
It has become more than a fad among the shop foremen of the big factories in the Naugatuck Valley to organize what are known as "Foremen's Associations," and there are several very successful organizations of that kind in existence throughout this section now. The pioneer organization of them all, it is understood, is that of the Plume & Atwood Manufacturing Company, which has plants in Waterbury and Thomaston, Conn., and at its recent banquet this society celebrated with great spirit and full consciousness of the good example it had set for the other factory communities, for all about them similar societies have planned their organization according to the Plume & Atwood idea.

OFFICERS OF THE PLUME AND ATWOOD MANUFACTURING COMPANY FOREMEN'S ASSOCIATION.



W. T. ASHCROFT, President. B. S. FENTON, Vice-President. E. E. HAYWARD, Toastmaster and Chairman Executive Committee. C. E. WIRTH, Executive Committee. E. C. SANDERSON, Executive Committee.

The Foremen's Association of the Plume & Atwood Manufacturing Company came into existence about three years ago. The motive for its creation was greater efficiency, and probably the best thing that can be said about it is that the idea of this organization originated among the foremen themselves. "Get together" was the whole incentive. This was desired for the pur-



BIRD'S-EYE VIEW OF ROLLING MILLS OF PLUME AND ATWOOD MANUFACTURING COMPANY AT THOMASTON, CONN.

pose of protecting heads of departments from unnecessary friction, arising through misunderstandings often of a trivial nature in their dealings with heads of other departments. In the modern American business spirit the men who endorsed the plan got together and considered how best to get this spirit of affiliation launched, and it was not long before organization was affected. The company was apprised of the plan, looked into it carefully, and as soon as the proposition was laid before its executive officers it was given its hearty endorsement. That removed the last obstacle to a flood of enthusiastic co-operation among the foremen, and, with all helping to get the association started right, it met with instantaneous success.

At its last banquet, January 18 last, the foremen had the best of all their annual jollifications, but it was fun properly tempered with consideration of such matters as were appropriate. E. E. Haywood was toastmaster, and among the speakers were: W. T. Ashcroft, president of the association; F. T. Millham, secretary of the Plume & Atwood Company; John L. Scott, assistant treasurer of the company; R. C. Ratto, T. A. Maton, J. H. Hurlbut, general manager of the company; S. Kellogg Plume, manager of the Thomaston plant of the company; J. Williams, R. L. French, mill superintendent, Thomaston; N. D. Holbrook, Thomaston; J. B. Burrall, president of the Plume & Atwood Company; W. R. Roden and A. Matthews. Some of the members entertained with vocal solos and there was instrumental music. One of the treasured souvenirs of the event was a brass candlestick, one being presented to each member with the compliments of the president of the company, Mr. Burrall.

The following were present:

L. W. Anderson, W. T. Ashcroft, G. F. Bates, W. H. Black, G. H. Brodeur, L. J. Brodeur, G. H. Burliegh, President J. B. Burrall, of the Plume & Atwood Company; William Byers, W. E. Chase, P. J. Chabot, R. H. Dean, E. K. Diver, H. D. Emmons, Superintendent of Factory B. S. Fenton, Superintendent of Mill R. L. French, J. L. Geist, Mechanical Engineer W. M. Hall, E. E. Hayward, W. G. Hitchcock, W. D. Holbrook, Treasurer and General Manager J. H. Hurlbut, of Plume & Atwood Company; J. J. Kneen, E. V. LaRue, J. H. Leddy, W. Markle, T. A. Maton, A. Matthews, C. W. Matthews, F. E. Merrick, Secretary F. T. Millham, of the Plume & Atwood Company; C. B. Morris, M. J. Mulcahy, B. L. Nettleton, Assistant Superintendent of Factory G. L. Page, L. F. Parker, W. D. Platt, Mill Manager S. K. Plume, R. C. Ratto, W. H. Roden, W. W. Rowe, E. C. Sanderson, George Schissler, E. C. Schwartz, N. H. Schwartz, Assistant Treasurer J. L. Scott, of the Plume & Atwood Company; Vice-President R. C. Swayze, of the Plume & Atwood Company; H. N. Thompson, W. B. Wilbur, J. Williams, C. E. Wirth, A. E. Woodward.

AMERICAN ELECTROCHEMICAL SOCIETY

President, W. R. Whitney; Treasurer, Pedro G. Salome; Secretary, Joseph W. Richards. All correspondence should be addressed to the secretary, Joseph W. Richards, Lehigh University, S. Bethlehem, Pa. The objects of the society are to promote the theory and practice of electro-chemistry and electro-metallurgy.

The New York Sections of the American Chemical Society, Society of Chemical Industry and this Society held a very successful Symposium on "Alumina," at the Chemists' Club, February 7. The papers were The Serpek Process, by J. W. Richards; The Relation of the Serpek Process to the Fixation of Atmospheric Nitrogen, by S. A. Tucker; Production of Alumina from Aluminum Silicates, by A. H. Cowles, and Fused Alumina as a Refractory Material by L. E. Saunders. Mr. Lawrence Addicks was chosen Chairman of the Section (of this Society) for the ensuing year, and Dr. E. F. Roeber Secretary-Treasurer.

Secretary Richards reports that the spring meeting of the Society will be held at Atlantic City, April 3 to 5, 1913. The last day, April 5, will be devoted to a symposium on electroplating. He says:

"Indications point to a large attendance and a profitable program. In addition to the advance papers already distributed, which include Electrodeposition of Gold and Silver, by T. C. Frary, and Electrodeposition of Copper, Brass and Bronze, by C. W. Bennett, papers are promised from E. F. Kern, H. T. Kalmus, Carl Hering, O. P. Watts, C. F. Burgess, C. W. Bennett, F. A. J. FitzGerald, T. F. Baily, R. Beutner, E. F. Northrup, J. H. Hildebrand and J. W. Richards. It is hoped to distribute most of these papers with the March Bulletin. Members who have not yet notified the Secretary of their intentions to attend are requested to do so, and such as have not engaged hotel accommodations (at Hotel Traymore) are advised to do so without delay."

ITEMS OF INTEREST TO THE INDIVIDUAL.

Henry J. Turner, of Buffalo, N. Y., who has been active in the Chamber of Commerce, has been made vice-president of the Chadwick Brass Company, Ltd., of Hamilton, Ont., Canada.

Charles W. Douglas, who has been reporter for the Attleboro (Mass.) Sun and correspondent for THE METAL INDUSTRY from that city, has accepted a position as traveling salesman for the E. A. Potter Company, of Providence, R. I.

Charles Brady, of Cleveland, Ohio, has been appointed general manager of the plant of the Aluminum Castings Company at Manitowoc, Wis. He succeeds Conrad Werra, who recently resigned to organize the Waukesha Aluminum Company.

H. T. Taylor, traveling representative of the Hill & Griffith Company, foundry supplies, Cincinnati, Ohio, has resigned and accepted a similar position with Frederic B. Stevens, of Detroit, Michigan.

George F. Comstock has resigned his position as metallurgist with the Park works of the Crucible Steel Company, of Pittsburgh, Pa., and has gone to Niagara Falls, where he will have charge of the physical testing laboratory of the Titanium Alloys Manufacturing Company.

F. H. Allison has been appointed general purchasing agent in charge of all office and factory supplies for the American Vanadium Company and the Flannery Bolt Company, both of Pittsburgh, Pa.

Charles H. Poland, formerly foreman of the plating and polishing departments of the White Manufacturing Company, Bridgeport, Conn., has been appointed superintendent of the plant of the Jennings Bros. Manufacturing Company, manufacturers of soft metal novelties, also of Bridgeport.

John H. Burns, Jr., who for a number of years had charge of the purchasing department of Dodge Bros., of Detroit, Mich., has severed his connection with the above firm and has associated himself with I. M. Jacobson & Sons, Manufacturers, Smelters and Dealers in all metals and alloys, General Offices, 408 Ford Building, Detroit, Mich, and will devote his entire time to their interests. I. M. Jacobson & Sons are now operating their new Smelting Work, located at 70-72 Catherine street, Detroit.

DEATHS

John C. Lefferts, Brooklyn, N. Y., a pioneer in the process of galvanizing metals, died February 26, at the age of seventy-five. Mr. Lefferts was a descendant of the old Holland family which helped to settle Flatbush, and was a member of a number of local clubs and organizations.

Fritz A. Schulz, Chicago, manufacturer of metal spinning lathes and presses, died February 23 from typhoid pneumonia, following a short illness. He leaves a widow and five children. The business of which he was proprietor will be continued at 4824 West Lake street, although a reorganization will be necessary.

William McIntyre, for the past ten years assistant foreman of the polishing, buffing and plating departments of the H. Mueller Mfg. Company, Decatur, Illinois, died on January 19. Mr. McIntyre's death was very sudden as only two days before he was at work. He was born in New Britain, Conn., in 1872, and was for a number of years in the employ of the Bradley & Hubbard Company of that city.

William H. Barbour, manager and designer of the copper department of the Barbour Silver Company, known as Factory A of the International Silver Company, Meriden, Conn., died at his home in that city on February 3, at the age of fifty-seven. Mr. Barbour has been connected with the silversmithing business for over thirty years. He leaves a widow, a daughter and three brothers.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

PROVIDENCE, R. I.

MARCH 3, 1913.

With the closing days of the month of February came a gradual though rapid falling off in practically all lines of the metal business, with little prospect of any immediate improvement of any general character. This was especially true in the manufacturing jewelry and kindred industries. With very few exceptions these establishments all entered upon March on a shortened working schedule because of few orders. Reports from all sections of the country made by returning salesmen indicate that there is very little business and it is not believed that there will be any improvement in business here until after the usual summer period. The agitation regarding the tariff has had a deleterious effect and with this has come the local unrest occasioned by the passage of the 54-hour bill for women and children by the Rhode Island General Assembly. Both political parties, as well as Governor Porthier were committed to the passage of such a measure, but the manufacturing jewelers, claiming that their business depended entirely upon the vagaries and whims of the people, sought without success to have a "season" clause inserted in the bill so that they could work additional time when there was business to warrant it. The solons refused to consider the jewelers and passed the bill.

The bronze foundry at the plant of the Gorham Manufacturing Company continues to work at its full capacity, with numerous large commissions on the books. One of the most important recent products of the foundry, Henry Hudson Kitson's bronze statue of Roger Conant, leader of the Cape Ann (Mass.) settlement, was unveiled in its temporary position in the forecourt of the Museum of Fine Arts at Boston, recently. It will remain there until about the middle of May, when it goes to its final pedestal in Washington Square, Salem. The statue, modeled by Mr. Kitson, is that of Roger Conant, who came to Plymouth in 1623 and was one of the founders of Salem in 1626. The figure is ten feet in height and will stand on a boulder in the Salem Common.

It is expected that within a few days the contract will be given for a new brass foundry for Fred E. Newell, to be located near his present one in Central Falls. The grade crossing changes that are being made in that city have made it necessary for the present building to be vacated and Mr. Newell will build on land adjoining his present location. The new building will be in part two stories in height and partly one story. On the night of February 10 the plant of the United Wire and Supply Company, North Main street, Pawtucket, began running five nights a week, all night, a night and day shift of operatives being necessary. This change was due to the increase in business and is expected to continue for some time if the orders continue to increase as they have been doing. The firm employs about 120 hands and the night shift is working twelve hours each night.

Frank E. Maynard, for several years manager of the Auburn plant of the General Fire Extinguisher Company, and for the past year manager of the Providence plant of the same concern, has left this city to become assistant manager of the western department of the company, with offices at Cleveland. In view of his departure he was the guest at a dinner held recently in the dining room of the Auburn plant by about 100 of the employees of the two local plants. During the evening Prof. W. H. Kenerson, supervising engineer, presented a bronze clock to Mr. Maynard. Henry A. Carpenter, who, for some time, has been manager of the foundry department of the company and of its publicity department, has now been made manager of the Auburn plant to fill the vacancy caused by Mr. Maynard's change of activities.

The Rhode Island Nickel Plating Works, 33 Garnet street, which for several years have been conducted by George W. Carpenter, have recently changed hands and are now owned by William F. Slade. Plans have been prepared by Silverman Bros., manufacturing jewelers, for a new three-story manufacturing structure at the corner of Lexington avenue and Broad street. The new building will be of mill construction throughout and will contain more than 25,000 square feet of floor space.—W. H. M.

ATTLEBORO, MASS.

MARCH 3, 1913.

This is the month devoted to sample lines. There is a rush in each factory to get the spring line ready, for the salesmen will start soon; meanwhile the orders are dribbling in just fast enough to indicate that February is a dull month as usual. The prospects for the spring trade are good, with only the tariff to bother because of the uncertainty. It will be April 1, probably, before the new paragraph affecting the jewelry industry is known. Meanwhile, of large importance looms the national jobbers' convention, which is to be held in Providence within a few weeks. The jewelers of the Attleboros will join with their Rhode Island brethren to extend a hearty welcome to the jobbers and special entertainment programs will be arranged.

The Attleboro board of trade has reorganized with Frank Mossberg, of the Frank Mossberg Company, as president. The space formerly occupied by the E. A. Slade Company has been added to the C. O. Sweet & Son Company as an enameling department. David Finn retired this month after a service of thirty-nine years, seven months, with the J. E. Blake Company. The R. F. Simmons Company this year celebrated the 40th anniversary of the firm.

Beginning March 1, the net price of gas here was reduced to one dollar per thousand feet by order of the state board of gas and electric light commissioners.— C. C. C.

NEW BRITAIN, CONN.

MARCH 3, 1913.

The addition of a vice-president in charge of foreign business to the officials of the American Hardware Corporation, New Britain's largest metal manufacturing concern, at the annual meeting held late in February, is considered by local men interested in the metal-ware business one of the most significant events of the month in this city. Officials of the corporation admit that the purpose of this election is to make a more aggressive campaign for foreign business. For several years the firm has been nursing a growing South American trade, and now that its products are favorably known throughout this hemisphere the plan is to push into lands across the sea and create a market for New Britain made products. A similar plan is under consideration by other factories, and men familiar with the business believe that in half a decade this policy will result in as large a market for New Britain products abroad as there now is in America. Benjamin S. Hawley, who was president of the Russell & Erwin factory until its consolidation with the American Hardware Corporation a year ago, when all the subsidiary companies were united, has been selected for this vice-presidency. Mr. Hawley has been interested in the South American end of the business, and was selected to take charge of the foreign affairs after he had successfully demonstrated his ability along these lines.

As soon as spring advances far enough to make the work possible, the new factory building to be occupied by the Hart & Hutchinson Company will be begun. This building is to be 60 by 300 feet in size. Land has been purchased for a much larger plant, and President Maxwell Hart has announced that he expects, within a few years, to have four buildings, the size of this first one, erected. Lockers and metal specialties will be manufactured, and about 300 hands will be employed as soon as the new factory building is ready.

Early in the month officers of the Landers, Frary & Clark Corporation were chosen. Charles F. Smith again was elected president. Miss Martha A. Parsons was chosen secretary of the company. This is a $2,000,000 corporation, and it is believed that in this office Miss Parsons occupies a more important position than any other woman in Connecticut. She started work with the company twenty-five years ago as a stenographer.

The annual banquet of the P. & F. Corbin Foremen's Club was held February 20. The club's motto, "Get together, keep together, work together, and boom the Corbin products," occupied a prominent place in the banquet hall. After-dinner speeches by members of the club and officials of the company were enjoyed.

In every New Britain factory there is a mutual aid association of employees. All are benefit organizations, and nearly all have recently issued annual statements. There is not an association of this kind in the city that is not in a flourishing financial condition.

There appears to be no let-up here in the splendid condition of business. None of the factories are working less than fifty-six hours a week, and several are keeping the power running a full sixty hours. Orders on hand will carry the concerns along for several months. Salesmen who return say that the demand for products of the local factories is good. It is believed that, if Congress will only go a bit easy with the tariff ax, nothing will happen to mar the prosperity of this community.—A. L. M.

NEWARK, N. J.

MARCH 3, 1913.

The spring trade is opening up in fair proportions, but there is no heavy demand for gold, silver or platinum lines. We do not look for anything unusual, only the regular lines selling, as well as novelties, which are always strong. It looks as if the demand for platinum goods will go back somewhat to the gold lines. The rich class, however, will continue to wear platinum, which will be largely distinctive and made to order.

John C. Cory has retired from Cory, Clark & Noon, gold jewelry manufacturers. The old name will be continued, the partners being Louis F. Clark and Walter S. Noon. Schless, Brod & Company, jewelers, have taken the entire building at 28 Beecher street. The factory has been greatly enlarged, and have added to their lines the making of emblem goods. Victor Newman opened a plant at 15 Ward street, to do gold and silver plating and refinishing.

The Weigle & Rose Company was incorporated to continue the business of the old ring making firm, and moved from 61 Arlington street to 42 Walnut. E. A. Rose is president; Jacob Schaefer, vice-president and superintendent. The Gray-Howes Company's business grew so fast in the making of gold and silver goods that they moved the plant to much larger quarters, from 95 Oliver street to 20 Laurence street. New machinery was put in and other improvements were made. The Frederick Koch Company, making metal novelties of brass and bronze, of 87 Orange street, are building a new $50,000 factory, which will be equipped with all the latest machinery. Alfred Sandoz, who was with B. M. Shanley and in partnership with B. E. Clark, opened a plant at 56 Stratford place, to manufacture 10 and 14-karat gold chains, sterling and plated silver novelties.

The sixth annual Newark Auto Show was held in the First Regiment Armory, February 15-22. The number of pleasure cars and commercial vehicles represented was 304 and the estimated total value of the exhibits was $750,000. Over 900 salesmen were in the booths and they were kept busy looking after prospective customers.

A voluntary petition in bankruptcy has been filed by Chambers & Company, brass founders, 2 Commercial street, and a meeting of the creditors was held on February 21. As no proposition was presented, the receiver, G. B. Phillips, made application for an order from the court to dispose of the assets and will go ahead with the sale as soon as this order is executed.

The Essex Brass Smelting and Refining Works announce that some of the largest concerns in Newark are now using their No. 1 and 2 brass and composition ingots.

The Verona Chemical Company are erecting an addition, 40 x 60 feet, to their chemical manufacturing plant.

Bertram E. Clark, late of 51 Maiden Lane, New York City, opened a plant at 109 Oliver street. He makes 14-karat gold and platinum chains, sterling silver mesh bags and novelties. Frank J. Huebner, who was manufacturing jewelry and novelties at 43 Lawrence street, went out of that line and organized the Eagle Brass and Metal Works, at 324 Fairmount avenue.—H. S.

PHILADELPHIA, PA.

MARCH 3, 1913.

The spring business so far is just fair, but the movement of the various lines shows some signs of activity. There is, however, some uncertainty as to business conditions, which will no doubt adjust themselves in time. The demand for gold, silver and platinum goods is not strong, but a moderate sale is reported. The brass and bronze trade is also a little quiet, but is picking up some. The Tubular Products and Steel Works, which have been incorporated in Wilmington, Del., for $300,000, will have a plant in Philadelphia, to manufacture steel and brass pipes and tubes. The incorporators are Edwin E. Natcher, Charles G. Guyer and S. E. Becker, of Wilmington. J. E. Caldwell & Company, of this city, made a fine bronze and gold tablet for the Carnegie Hero Commission. It will be placed in the National Museum at Washington in memory of the heroes and heroines of the *Titanic* disaster.

White & Bro., Inc., smelters and refiners, announce that they have removed their office from 1505 East Montgomery avenue to Hedley and Richmond streets.

The Edwards & Smith Company, metal founders and machinists, removed their factory on February 1 to Easton, Pa. The Philadelphia office of the company will be in the Real Estate Trust Building. W. Neilson Edwards, president, says: "The new factory is located on a tract of over three acres and the buildings, which are fireproof, provide for brass, bronze and aluminum foundry, with separate metal and furnace rooms; also pattern and machine shop, finishing department and a polishing and nickel-plating shop. The business will be doubled and special attention given to general jobbing, also manufacturing specialties for the automobile industry."

Thomas Savill's Sons, manufacturers of plumbers' brass goods, will erect a two-story brass foundry at Wallace and Watts streets. The building will be 32 x 40 feet with a wing 36 x 40 feet.—H. S.

HARRISBURG, PA.

MARCH 3, 1913.

The Nuss Manufacturing Company two years ago built their own three-story factory at South Cameron and Mulberry streets. They do electro-plating and manufacture band instruments.. A. H. Nuss has charge of the manufacturing end and C. W. Nuss is in charge of the plating. They have their own formula for xylophones, which are of high carbon steel, nickel-plated and very sensitive. Have been working on some parts to be made for the United States Government bands. They have made a machine of their own to draw tubing, which will draw the brass, German silver, phosphor bronze, etc., from one-sixteenth of an inch to the thinness of tissue paper. The present plant is too small, and it is being enlarged now so that it will be one-half larger when completed, and will allow a considerable increase in the output. A general jobbing business is done in the plating line.

This firm uses steel tanks for silver plating. They paint hot asphaltum on the steel first and stretch a cheese cloth all over the inside of the tank. Then a thin coating is again put on of asphaltum with a hot iron. This forms a tank within a tank. It never comes loose or cracks as do some wooden tanks, but if a wood tank is used, the same process, the asphaltum and cheese cloth fills up the cracks. The band instruments have a satin or sandblast finish, while the inside of the bells to the wind instruments are finished mostly in gold, which is done by using the bell as a vessel. A cork is put in, the bell is held up, filled with chemicals and the electro process is added. The outside is done by waxing all parts that they do not want plated. The instrument comes out with the engraving and flowery designs in gold, the rest in silver, etc.

The Hickok Manufacturing Company, Canal and North streets, makers of ruling machines, have a very complete brass foundry for their own work.

The Harrisburg Brass and Bronze Foundry, of South Cameron and Paxton streets, have installed a chemical laboratory, which very few such plants have. They expect to double the size of the plant this spring, to cost $5,000, which addition will be used for molding and furnaces. They are making brass and bronze castings, hydraulic metal, Babbitt metal, etc. The firm is composed of C. Weaver, R. W. Weaver and William T. De Hart.

The Elliott and Fisher Typewriter Works is the largest and only firm in the world making book typewriters. It is made in all languages, and they also make the Bennett pocket typewriter. A large concrete building is being erected to cost $100,000. When this building is completed the old building will be torn down and another concrete building will be erected to take its place, which will triple their output. They have a first-class plating plant, which will also be enlarged. The main office was in New York City, but it has been removed to the factory in this city.—H. S.

DETROIT, MICH.

MARCH 3, 1913.

Detroit brass and aluminum manufacturers have just closed another successful month. While business may not have been quite up to those earlier in the season, nevertheless business of all kinds in those two lines of the metal industry has been satisfactory in the majority of reports regarding the midwinter month. Manufacturers now are looking forward to the spring opening, and it is believed that the coming season will be one of the best in the history of the Detroit business. Those institutions which cater to the automobile trade are already in full swing for a long period of business. The manufacture of brass and aluminum parts in Detroit during the coming season will be one of the greatest in the history of the business. One of the recent announcements along this line is that of the Ford Automobile Company which, it is said, will, within the next few months, double its present force of workmen. This will bring the working force at the Highland Park plant up to eighteen thousand men.

At the annual meeting of the Michigan Hardware Dealers' Association it was announced that members in some of the cities of the state have decided to pool issues so as to obtain bottom prices and thus be able to compete with mail-order houses which some assert were obtaining better figures from manufacturers than the small dealers. The plan, in short, is to reach minimum prices through larger orders. Members at this meeting also showed they are opposed to a flat rate parcel post which it was announced by President Abbott, of the association, is being urged by the catalog houses. A fine exhibit of hardware of every description was displayed at the Detroit Light Guard Armory. The following officers were elected: President, Fred A. Rochlin, Bay City; vice-president, E. J. Dickinson, St. Joseph; secretary, Arthur J. Scott, Marine City; treasurer, William Moore, Detroit; executive committee, J. J. Vandermere, Grand Rapids; J. C. Van Male, Kalamazoo; John D. Potter, Alpena; William Strobel, East Jordon.

The Chandler Motor Car Company, of this city, is looking for a factory site in Cleveland, O. The officers of the company are: President, F. C. Chandler; secretary, W. S. Mead; superintendent, J. R. Hall. The Columbia Castings Company, maker of aluminum castings for automobiles and motorcycles, has completed its new plant, which doubles its capacity.

R. B. Carolin, formerly brass foundry foreman of the Clayton & Lambert Mfg. Company, has started a foundry at 825 Superior street, for the manufacture of aluminum, brass and bronze castings. The Zenith Carbureter Company, 262 Jefferson avenue, is contemplating the installation of a brass foundry in its works.—F. J. H.

LOUISVILLE, KY.

MARCH 3, 1913.

Generally speaking, business among metal workers in this vicinity is seasonably quiet, to the point of dullness in some cases, although several of the better known concerns in the various lines report that they are kept busy up to the limit of their capacity. Plumbing supply manufacturers especially state that business is good, although collections seem to be slow. The business outlook is, on the whole, very good, however, and the general tone is decidedly optimistic, the induction of a new president, with all that it signifies in the present case, being considered no reason for a gloomy view of trade conditions.

The condition of business among some of the well-known Louisville members of the trade may be gathered from the following statements from them:

Matt Corcoran & Company, manufacturers of distillers' supplies: "While the active season in our line is practically over, especially in view of the unusually early start taken by the distillers this year, we still have about all we can do, not only in getting up new orders from various sections of the country, but in making repairs. We have nothing to complain of."

Hoffman, Ahlers & Company, distillers' supplies: "The only trouble we have is in getting enough good men to handle our work. We are not doing much just now in distillers' supplies, but other work of a similar nature is keeping our force and our facilities busy."

Manager Rindt, of the Art Brass & Plating Works: "Business continues fairly good with us, although of course not as active as at other periods of the year. We are experiencing the usual difficulty in getting material from the wrought iron mills, the best we can do being to get our orders filled in ninety days. All of the mills seem to be swamped with work."

Albrecht & Heick Hardware Company, dealers in sheet and rod brass: "The demand for this material is fair, but nothing extra. Plumbers, especially, report that business is good, and the jobbers seem to be busy, but there seems to be little stuff moving. Everything looks good, however, and we see no cause for worry."

Louisville Brazing & Machinery Company: "Things are seasonably quiet, but we haven't any kick coming, as we are getting our share, and manage to keep pretty busy. There is nothing wrong with fundamental conditions, and while collections are somewhat slow, due to various causes, we are rather optimistic than otherwise."—G. D. C.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Elgin Brass Company have leased the store and basement at 94 John street, New York.

G. A. Schlechter, of Reading, Pa., is making a specialty of the manufacture of scarf pins, having filled an order for 100,000 of them.

The Stratford Brass Company has recently been organized at Stratford, Ontario, to manufacture brass trimmings for furniture, etc.

The Dominion Hose Coupler Corporation, has been incorporated at Buffalo, N. Y., to manufacture hose couplings and similar brass goods.

The Crescent Brass Manufacturing Company, spinners in all metals, Cleveland, Ohio, have increased their capital stock from $10,000 to $35,000.

The Keystone Chandelier Mfg. Company, manufacturers of chandeliers, Johnstown, Pa., are making additions to their plant which will triple their output.

The plating department of the Sessions Clock Company, Forestville, Conn., has been so busy that they have been running until 9 o'clock evenings for the past month.

The Gardner Machine Company, manufacturers of polishing machines, South Beloit, Wisconsin, are erecting an addition to their plant. No additional equipment will be required.

The Lorain Brass & Bronze Foundry Company, Lorain, Ohio, manufacturer of brass, bronze and aluminum castings, is building a new plant. E. M. Gable is general manager.

The James-Edwards Bronze Works, manufacturers of valves, bushings, composition castings and aluminum, white metal and brass pattern plates, Pittsburgh, Pa., are now operating a pattern shop.

The J. D. Bergen Company, manufacturers of cut glass, Meriden, Conn., on the first of this month took up the manufacture of silver deposit ware. Walter H. Bradley is president and manager of the company.

The Cast Aluminum Ware Company has recently been organized at Preston, Ontario, for the manufacture of aluminum cooking utensils. Plans are now in course of preparation for the building and equipment.

The Standard Aluminum Company, Two Rivers, Wisconsin, have just broken ground for a modern rolling mill. They have just installed a combination stamping and drawing press and have contracted for another large toggle press.

The Scovill Manufacturing Company, Waterbury, Conn., report, through E. O. Goss, general manager, that they are erecting a new building, 125 by 160 feet. The purpose to which this building will be put is not stated.

The White Adding Machine Company has been incorporated at New Haven, Conn., with a capital of $1,000,000, to manufacture adding machines. The incorporators are Max Adler, R. S. Woodruff, R. P. Tyler, E. S. Swift and Charles Wales.

The Troy Nickel Works, Albany, N. Y., has practically completed its new factory erected in place of the plant destroyed by fire last summer. New machinery and equipment, most of which is of a special nature, will be installed at once.

The Meadville, Pa., Industrial Committee has agreed to furnish a site for a new plant of the Bronze Metal Company. This company now has plants at Meadville and Hillburn, N. Y., and it is said that the works will be combined at Meadville.

The Noyes Machine Company, manufacturers of propellers and brass specialties, Portland, Maine, have rented part of a building in St. John, New Brunswick, for use as a machine shop. This is to take care of the Canadian end of their propeller business.

The International Silver Deposit Works, New York, have leased the second floor of the building at Madison avenue and Thirty-third street. They have moved from the Maiden Lane section to be near the hotels for the convenience of out-of-town customers.

The Indianapolis Aluminum Castings Company, recently incorporated at Indianapolis, Ind., with a capital stock of $50,000, has purchased the plant of the American Brass & Aluminum Company and is installing new machinery for the manufacture of aluminum.

The F. I. A. T. Company, manufacturers of automobiles, Poughkeepsie, N. Y., are erecting an addition to their plant which will give them approximately 30,000 square feet of floor space. This company operates its own brass foundry, metal working shop and plating room.

The Apothecaries Hall Company, wholesale druggists, Waterbury, Conn., announce that they have installed a new 8,000-gallon storage tank for pure gum spirits of turpentine which they sell in galvanized steel drums. The company guarantee purity, full measure, low price and prompt service.

The Heer-Schofield Company, silversmiths and electro-platers, Baltimore, Maryland, have completed their new three-story factory at 308 St. Paul street. They will have a first-class melting plant and etching rooms. This firm have completed a $4,000 silver service for Maximillian Brothers of Rio de Janeiro, Brazil.

D. J. Renaud & Son, brass and iron founders, Carthage, N. Y., have practically completed their new concrete factory. The structure comprises three departments, a general foundry, 48 by 70 feet; a brass foundry, 30 feet square; and the machine shop 30 by 50 feet. A 42-inch lathe and a traveling crane are to be installed.

The Rochester Brass & Aluminum Company, Rochester, N. Y., will erect a $15,000 factory, containing a floor space of 65,000 square feet, to be constructed to conform to the most modern ideas for acquiring light and working space. They state that the indications, from orders on file, are that they will have a prosperous year.

Herrmann Gehnrich, manufacturer of sectional portable ovens for japanning, enameling, drying core baking, sherardizing, lacquering, etc., has removed from 518 Water street, New York, to 60-62 Franklin avenue, Brooklyn, N. Y., where greatly increased facilities place him in a position to make better deliveries.

The Mohawk Valley Manufacturing Company, of Utica, N. Y., have bought a building at Oneida, N. Y., and will move their factory to that city. They manufacture brass specialties for carriages and automobiles and rotary gasoline engines. The new factory will be larger than their present one and will employ fifteen more hands.

The White Engineering Company, manufacturers of power hammers, steel and brass castings, Bellefonte, Pa., has taken over the plant of the J. Howard Lingle Company and have acquired the right to manufacture the Lingle power hammer. The officers of the company are: Richard T. White, president; Victor E. Rehr, secretary-treasurer.

The Hammond Steel & Forging Co., Inc., Syracuse, N. Y., announce that they are specialists in the forging of high-grade tool steel rings, which are made up into drawing dies for drawing soft metals. They also forge up discs from tool steels suitable

for making dies. Among the other products of this company are gear blanks, planer heads, crank shafts and alloy steels.

The Roessler & Hasslacher Chemical Company, manufacturer of chemicals, Perth Amboy, N. J., will build a new three-story brick and steel structure, 45 x 80 ft., on Front street, near Commerce street, to be used as a platinum, gold and silver refining plant. The company also contemplates the erection of a plant near Staten Island Sound, as an addition to its plant No. 1, for compounding chemicals.

The Ohio Brass & Copper Company, of Cincinnati, O., is preparing to double the size of its plant in that city, moving from 424 Elm street to 412 Elm street for that purpose. The move will take place within the next month, the company having already taken a five-year lease on its new quarters, where it will install a considerable equipment of additional machinery to meet the demands of its increasing business.

The Chemists Club, 52 East Forty-first street, New York, has opened what is said to be the largest chemical library in the country. It will be open to the public every day, except Saturday, Sunday and Monday, but to members of the club it will be open at all times, even evenings. Thus those interested in chemical subjects, especially electro-platers, in the vicinity of the metropolis, now have access to an unequaled source of information.

It is stated that the Aluminum Goods Manufacturing Company, Manitowoc, Wis., have completed plans for the erection of a $40,000 addition to their plant, and work will be started at once. The new building, which will be southwest of the present plant, will be 200 by 50 feet, and will be utilized for extension of the manufacturing department. The company now employs 180 people, and with the addition the force will exceed 225.

The Carolina Machinery & Manufacturing Company, whose address is Box 590, Sumter, S. C., is a recently organized concern which intends entering the brass foundry field, and to that end desires the following information relative to the business: Addresses of manufacturers of brass foundry equipment; location of necessary material. The company will also correspond with competent brass molders with a view to employing them when its operations begin.

The Remington Arms-U. M. C. Company, Bridgeport, Conn., have decided to establish a plant at Windsor, Ontario. A site of 100 acres has been purchased and buildings are now in course of construction. It is expected to start operations in one building in April with fifty employees. This building will be a two-story manufacturing building, 50 by 125 feet. The additional buildings will be placed in operation as soon as they are completed.

The Smith Facing & Supply Company, of Cleveland, Ohio, has been organized to engage in the manufacture of foundry facings and supplies, and has purchased the building and machinery of the plant formerly known as the Cleveland Facing Mills and operated by the J. D. Smith Foundry Supply Company during the last twelve years. The officers of the company follow: Geo. W. Fleig, president; P. G. Smith, vice-president, and J. S. Smith, secretary and treasurer.

Lesch and Farrell, gold and nickel electro-platers and polishers, have enlarged their plant at 210-212 Canal street, New York City, taking the entire loft of 3,000 square feet of floor space, to facilitate the handling of the enormous increase of business on hand. They have installed a new 400 gallon nickel solution, 400 gallon silver solution and a repairing and assembling department. The plating and polishing departments have been entirely renovated and in fact the entire plant is now modernly equipped and up to date.

The dream of Manitowoc, Wis., of becoming the center of the aluminum industry appears to be rudely shattered for, following the announcement of the removal of the Wisconsin Aluminum Foundry Company, it is now reported that the Aluminum Castings Company is to close its plant and will use the equipment in the plants at Cleveland, Detroit, Buffalo and Fairfield. It is said that unsatisfactory labor conditions are responsible for the rumored removal of these plants, which will throw nearly 200 men out of employment.

Conrad Werra and Alex. Pankratz, of Manitowoc, Wisconsin, have established at Waukesha, Wisconsin, an aluminum foundry to be known as The Werra Aluminum Company. The company is incorporated with a capital stock of $110,000, and have taken a lease on the abandoned shops of the Wisconsin Central Railway. The buildings are now being altered for foundry purposes and contracts being placed for the equipment. Mr. Werra established the Aluminum Foundry Company at Manitowoc, fourteen years ago. In 1909 the plant was purchased by the Aluminum Castings Company, and Mr. Werra continued as general superintendent, while Mr. Pankratz remained as factory superintendent.

The Cox Brass Manufacturing Company, Albany, N. Y., was one of the pioneers in the manufacture of high-class brass fittings for motor cars, and the growth of this industry is indicated by the fact that this company has over one hundred employees at Albany, and even more in their Detroit plant. The inventive genius of W. G. Cox, president of the company has been responsible for many things which are now taken as a matter of course by motorists. His latest invention is the Cox shock absorber, which is a small arrangement of levers and coiled springs, which take up from fifty to one hundred vibrations a second. They are made with ample grease cups and enclosed in seamless brass tubes.

DECLARATION OF DIVIDEND

International Nickel Company, at a special meeting of the board of directors, declared a dividend of 3 per cent. on the common stock, and the regular quarterly dividend of 1½ per cent. on the preferred stock.

Common dividend is payable June 2, to stock of record May 14. Books close on May 14 and reopen June 3.

Preferred dividend is payable May 1 to stock of record April 12. Books close April 12 and reopen May 2.

International Nickel's declaration of a dividend of 3 per cent. on the common stock for the first quarter of 1913 means a distribution of $1,140,000 to the common stockholders. The declaration of 3 per cent. on the increased common capitalization, which now totals $38,000,000, is equivalent to 9.8 per cent. on the former common capitalization of $11,582.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., March 25, and publicly opened immediately thereafter to furnish at the Navy Yard, Puget Sound, Wash., a quantity of naval supplies as follows: Sch. 5226, copper, sheet, soft and hard; Sch. 5227, brass tubing.

At the Navy Yard, Boston, Mass., Sch. 5241, brass voice tubing. At the Navy Yard, Norfolk, Va., Sch. 5241, rolled sheet zinc; Sch. 5245, brass bolts and nuts. At the Naval Torpedo Station, Newport, R. I., Sch. 5249, torpedo bronze and copper tubing. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office nearest each yard, or to the bureau. T. J. Cowie, Paymaster-General, U. S. N.

ANNUAL EXHIBIT OF EVENING WORK AT PRATT INSTITUTE

The Annual Exhibit of the work of the evening classes in Pratt Institute, Brooklyn, will be held on Monday evening, March 17, from eight to ten o'clock, and is open to the public.

The work of the School of Science and Technology should prove of especial interest to men engaged in technical and trade pursuits. This school provides instruction in industrial electricity, technical chemistry, mechanical drawing and machine

design, strength of materials, stationary engineering and power plant machinery, machine work and tool-making, carpentry and building, pattern-making, sheet metal work, plumbing and advanced manual training for teachers.

FOREIGN TRADE OPPORTUNITIES

(In applying for addresses at Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to file number.)

No. 10461. Metals, chemicals, machinery, oils, rosin, and provisions.—A business man in Germany informs an American consulate that he desires to acquire American agencies for raw materials, metals, chemicals, machinery, oils, mining products, rosins, and provisions. The inquirer furnishes references, and correspondence may be in English.

No. 10512. Brass musical instruments.—A report from an American consular officer in a Latin-American country states that a resident of his district requests the local agency for American manufacturers of brass musical instruments. A previous request from this person elicited no responses from American manufacturers, and the inquirer is anxious to make connections with firms in the United States as soon as possible.

ELECTIONS

The Stanley Rule & Level Company held its annual meeting a few days ago. Alix W. Stanley was elected president, R. N. Peck, vice-president, and C. B. Stanley, secretary and treasurer.

The past month has been one of annual stockholders' meetings in nearly all of the New Britain, Conn., corporations. Stockholders of Traut & Hine re-elected the old board of directors, and George W. Traut was elected president and treasurer, and H. C. Hine secretary.

At the annual meeting of the Stanley Works, New Britain, Conn., L. H. Pease was re-elected treasurer, but retired as secretary, which office he had held for twenty-five years, as he desired to be relieved of some of his duties. H. B. Humason, the assistant secretary, was promoted to the secretaryship.

Charles M. Jarvis is again president of the American Hardware, and Charles H. Parsons, first vice-president. Charles E. Wetmore was elected treasurer, and Andrew J. Sloper secretary. The only change in the directorate was the election of ex-Governor Rollin S. Woodruff, of New Haven, to membership on the board.

At a meeting of the stockholders of the Wm. B. Durgin Company, held on February 21, the following directors were elected: Edward Holbrook, of New York; John S. Holbrook, F. C. Lawton, of Providence, R. I.; Benjamin A. Kimball, Frank S. Streeter, Barton P. Jenks and John B. Abbott, Concord. The board organized by the choice of Barton P. Jenks, president; John B. Abbott, treasurer, and Frank S. Streeter, clerk. The report showed the business of 1912 to have been the heaviest in the history of the company.

At the annual meeting of the Detroit Copper and Brass Rolling Mills the following officers were elected: President and general manager, Lewis H. Jones; vice-president, Richard P. Joy; assistant general manager, John R. Searles and Frank F. Hoffman; secretary and treasurer, Andrew J. Peoples; assistant secretary and treasurer, Wallace Bache; auditor, J. Ernest Workman. Owing to ill health this company announces the retirement of William F. Montgomery, former secretary and treasurer. Mr. Montgomery has been one of the most efficient of this executive staff and it is with regret that his colleagues see him lay down his active duties for the present.

The American Brass Company, Waterbury, Conn., has elected the following officers for the coming year: President, Charles F. Brooker; vice-presidents, Edward L. Frisbie, Alfred A. Cowles, Thomas B. Kent and John A. Coe, Jr.; treasurer, John P. Elton; assistant treasurer, George E. Cole; secretary, Gordon W. Burnham; assistant secretary, Franklin E. Weaver. The directors are: Charles F. Brooker, James S. Elton, Alfred A. Cowles, Arthur C. James, Gordon W. Burnham, John J. Sinclair, Edward Holbrook, Edward L. Frisbie, John P. Elton, Cleveland H. Dodge, Thomas B. Kent, T. Brownell Burnham, John E. Wayland, James A. Doughty and John A. Coe, Jr.

The annual meeting of the Nicholson File Company was held at the office of the corporation recently when the following board of directors was elected: Samuel M. Nicholson, Marsden J. Perry, Arthur H. Watson, John Russell Gladding, George Nicholson, Walter W. Griffith and Paul C. Nicholson. At a subsequent meeting of the directors Samuel M. Nicholson was elected president and general manager; Arthur H. Watson, vice-president; George Nicholson, treasurer; Walter W. Griffith, secretary and assistant general manager; Henry W. Harman, assistant treasurer; Harold C. Field, assistant secretary; Paul C. Nicholson, assistant secretary, and Ernest S. Craig, assistant to the president.

CHANGE IN FIRM

The firm of Smith & Richardson, Attleboro, Mass., manufacturers of the Imperial ball burnishing machine and the Richardson jewelry drying-out machine, has changed its name to The Smith-Richardson Company.

The Otis Elevator Company have awarded a contract for the construction of a one-story and basement foundry, 106 x 402 feet, at Buffalo, N. Y. The usual foundry equipment of cranes, tumbling mills, sand blasts, etc., will be installed.

Edgar T. Ward & Sons, steel and metal manufacturers, Boston, Mass., announce that Edgar T. Ward, after having been in this business for thirty years, is retiring from business and withdrawing from the firm. John Ward and Edgar Ward have formed a co-partnership under the name of Edgar T. Ward's Sons and will continue the business as heretofore. The latest product of this company, Capital Ductile Gun Metal, was described in the February issue of THE METAL INDUSTRY.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

Henry O. Rogers Silver Company, Taunton, Mass. Capital, $75,000. Incorporators: Henry O. Rogers, W. E. McIsaac, J. J. Nichols, all of Taunton, Mass.

The Art Metal Company, San Francisco, Cal. Capital, $75,000. Incorporators: J. P. Sweeney, J. P. Lucey, G. C. Egan, E. O'Gara and B. Hastings, all of San Francisco.

Wheeler Brothers Brass Foundry, Troy, N. Y. Capital, $15,000. To manufacture and deal in metals of all kinds. Incorporators: Joseph, Henry, Bella and Bertha Wheeler, all of Troy.

Park City Silverware Manufacturing Company, Bridgeport, Conn. Capital, $25,000. To do machine work and molding. Incorporators: Otto Ventulett, John Ventulett and C. C. Donahue, all of Bridgeport.

The Indianapolis Copper Company, Indianapolis, Ind. Capital stock, $10,000. To manufacture copper, brass, aluminum and other metals. Directors: H. S. Steinbauer, J. J. Steinbauer and R. G. Dugan, all of Indianapolis.

New York Art Bronze Works, Inc., New York. Capital, $10,000. To make art bronze and other metals. Incorporators: Charles M. Hall and T. P. Hall, Brooklyn, N. Y., and Charles G. Wheeler, White Plains, N. Y.

The Leipsic Manufacturing Company, Leipsic, Ohio. Capital stock, $25,000. To manufacture brass, iron and aluminum goods. Incorporators: T. H. Rower, A. A. Slaybaugh, W. A. Bell, A. J. Huffman and W. B. Stevenson, all of Leipsic.

The Oldsmobile Company, Cleveland, Ohio. Capital, $50,000. To manufacture automobiles and electrical appliances of all kinds. Incorporators: P. D. Metzger, C. H. Davis, J. J. Schmidt, C. L. Lampus and C. O. Nelson, all of Cleveland.

PRINTED MATTER

Winnipeg.—A very interesting calendar has been sent out by the Winnipeg Industrial Bureau, of Winnipeg, Manitoba, giving data relating to the marvelous industrial growth of the city of Winnipeg. The calendar is 22 by 30 inches and contains eleven half-tone views of various parts of the city.

Aluminum and Bronze Castings.—The Light Manufacturing and Foundry Company, Pottstown, Pa., that had an extensive exhibit at the recent Automobile Show in New York, give a complete description and numerous illustrations of their large line of aluminum and bronze automobile castings in a new catalog "L" just issued.

Nickel Salts.—R. F. Lang, 31 Broadway, New York, has issued an attractive twelve-page booklet telling some of the things that "Royal" prepared nickel salts will do for the nickel plater. Mr. Lang also has salts for plating in gold, silver, copper, brass, tin, zinc and others. Interested parties should write for Booklet "N."

Metallic Alloy.—Za-de-ite, which is termed a fluorescent alloy for all metals except iron and steel, is described in a folder just issued by R. D. McKay, sales agent, 81 Chestnut street, Newark, N. J. Zadeite is described as a simple, effective and economical material for use in the production of brass and all non-ferrous alloys.

Brass Goods.—Catalog No. 10, issued by the Berbecker & Rowland Manufacturing Company, of Waterville, Conn., contains 352 pages and gives a complete description of the very extensive line of cabinet, drapery and upholstery hardware, plain, fancy and metalene upholsters' nails, cast and stamped brass goods, manufactured by them.

Manufacturing in Philadelphia.—The Philadelphia Commercial Museum, Philadelphia, Pa., have issued a handsome cloth-bound book containing 100 pages, giving the history of manufacturing in that city from 1683 to 1912. The book is written by J. J. MacFarland, librarian and statistician of the Museum, and gives a complete account of Philadelphia's manufacturing industries, with photographs of a number of the leading establishments.

Melting Furnaces.—The Hawley Down Draft Furnace Company, Easton, Pa., have issued their first catalog since the reorganization of the company. This catalog consists of 42 pages and gives a complete description of the different styles of metal melting furnaces manufactured by them, included among which are the well-known Hawley (Schwartz) furnaces which have been used with great success for the melting of large quantities of metals and alloys with a minimum of loss. A comprehensive view of the new plant at Easton is also given.

Polishing and Grinding Lathes.—The Backus & Leeser Company, 410 W. 13th street, New York, issue a catalog under the head of "Machinery Bulletin" which gives a complete description of the line of metal finishing machinery represented by them. This line includes polishing and buffing lathes, countershafts with patented belt attachments, swing frame grinding and polishing machines, portable grinders and polishers, flexible shafts, universal joints, tumbling barrels and sand blast equipment, as well as nickel and electroplaters' supplies, dynamos and motors.

Neutrol.—A pamphlet on "The Use of Neutrol in Electroplating" has been published by the William Berkel Chemical Works, 683 Communipaw avenue, Jersey City, N. J. It contains, first, a non-technical description of Neutrol and the advantages of using it for regulating gold, silver, copper, zinc, brass and bronze electro-plating solutions; and, second, a technical explanation of how Neutrol accomplishes the object of keeping the solutions in uniformly good working order without adding cyanide. This interesting pamphlet will be sent free to those who will write for it.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

ADNEWS

Solder Wire.—The Standard Rolling Mills Inc., 363 Hudson avenue, Brooklyn, N. Y., are now manufacturing solder wire, from new stock, and strip lead and lead moldings.

Aluminum Solder.—Edwin Peters, 175 Franklin street, Ansonia, Conn., is advertising his simple aluminum solder which requires no flux and which he sells for 75 cents per pound.

Annealing and Hardening Furnaces.—The W. S. Rockwell Furnace Company, 50 Church street, New York, will send on request their catalog No. 43 of oil, gas, coal or coke fired furnaces.

Novelties.—The Naugatuck Novelty Company, 146 Ward street, Naugatuck, Conn., advertise their facilities for manufacturing metal novelties from sheet metal and wire in brass, copper, aluminum, tin or steel.

Testing Laboratory.—Louis G. Robinson, metallurgist and chemist, with laboratory and offices at 31 East Fourth street, Cincinnati, O., has a card in this issue. Mr. Robinson makes a specialty of metals and alloys.

Steel Forgings.—The Hammond Steel & Forging Company, Syracuse, N. Y., advertise their hammered tool steel forgings, weldless rings, slitter rings, discs and blanks, made from their special high grade tool steel.

Brazing Solder.—The Trenton Smelting & Refining Company, C. W. S. Munro, proprietor, Canal and Pearl streets, Trenton, N. J., are advertising their double refined brazing solder. They also manufacture high grade spelter.

Melting Furnaces.—The Martin Furnace Company, 403 Keyser Building, Baltimore, Md., introduce to the brass foundry their new double compartment fuel oil crucible furnace. They will gladly send a circular describing the unusual features of this furnace to interested persons.

Sand Blasts and Blowers.—Leiman Brothers' automatic continuous feed sand blasts and high pressure blowers and vacuum pumps; also their self-contained polishing bench, are featured in this issue. Catalogs covering all these and other lines may be secured by writing to their offices at 62 J-John street, New York.

Porcelain Enamel.—The Cleveland Metal Products Company, Ivanhoe road, Cleveland, O., are soliciting new accounts for high class porcelain enameling on sheet steel forms. They claim to have one of the greatest porcelain enamel factories in the country, and have excellent facilities for building special dies and tools and doing deep drawing in sheet steel.

"Optimus Plastic Alloy."—The Manning-Loeb Company, Matawan, N. J., manufacturers of platers' and polishers' supplies, have put on the market a new material, "Optimus Plastic Alloy," for reducing the loss of electrical current at the joints in copper wires. Their Bulletin M300 shows how one plant reduced the annual cost of maintaining each joint from $23.50 to 42 cents.

METAL MARKET REVIEW

NEW YORK, March 10, 1913.

COPPER.

The worst seems to be known about the copper market, and after a decline to around 14½ cents the market today is fairly well established at 14¾ to 15 cents.

With an increase in the American stocks during the months of January and February of over 37,000,000 pounds, consumers, naturally, were not by any means over anxious to get in and while there has been a good buying movement there has been very little snap to the market.

Europe is short of copper and the demand from abroad has been mostly for March shipments. American consumers were not much better in this respect, as one wire manufacturer who had bought March copper called for it in February and was glad to get ingots rather than wait for wire bars. There is still considerable March copper yet to be bought, and the market generally is in better shape than at any time since the break.

Conditions in Europe seem to be gradually improving, and with money easy again orders for copper will soon come along.

The exports during the month are fairly heavy compared with the last few months, being 26,767 tons against 25,026 tons in January and 35,418 tons a year ago.

TIN.

The price of tin in London shows a net decline for the month of nearly £10 per ton, while price in America is about 5 cents per pound lower. One day we are told the bull clique is unloading—next day there is an advance of £3 or £4, and that is evidence that the bulls still control the market, etc., etc., and prices can be put anywhere. If the bull clique really does control the tin market there must be a glorious short interest to be accounted for.

The arrivals during the month have been fairly heavy and we have plenty of tin coming along, at the same time tin plate works are all busy and there is no sign of any lessened consumption.

The price of tin today is around 47½ cents, and this price looks fairly cheap to us.

LEAD.

There has been no change during February, the trust price has been held at 4.35 New York, 4.20 East St. Louis, and the independents have to meet these figures.

SPELTER.

The spelter market has been gradually pushed down to below 6 cents East St. Louis for futures, and prompt shipments are within a few points of this figure. There is talk in the Joplin district of a shut-down until prices get better again, but against this an increase in production is predicted in other quarters and it is also to be noted that consumption seems to be somewhat halting. Prices today 6¼ New York, March and April 6.15. Market is firmer with upward tendency.

ALUMINUM.

The market is rather firm again and, as previously pointed out, the consumption has overtaken production and the European market seems to be in the same state so that prices are likely to be higher. Market today for 98-99 ingots, 26½ to 27 cents.

ANTIMONY.

Prices have been steadily declining and we are now below the import parity. Cooksons is quotable at 9c., Halletts 8.75c., Hungarian grade at around 8c.

SILVER.

Prices lower again at 60⅞ against 64 cents a month ago. London today 28 1-16.

PLATINUM.

The market has been rather quiet and price stays around $51 for hard and $46 for ordinary refined.

QUICKSILVER.

The trust price is held at $40 per flask, with jobbing lots at $41 to $42 per flask.

SHEET METALS.

Sheet copper has been held at 22 cents by some mills, while others are asking 21 cents for base, and it is more than probable that this price can be shaded. With copper at 17¾ sheet was selling at 23 cents, and on today's copper market 20 cents would be nearer parity. Copper wire has come down to around 16 cents for base, and brass prices are now reduced from 1c. to 1⅛c. a pound. Sheet brass, brass wire and brass rods have been reduced 1⅛ cents a pound, seamless brass tubing 1c. a pound, with a reduction on the extras and copper tubing of 1c. a pound. This makes the base on seamless brass tubing 20c. a pound, and the base on seamless copper tubing 23c. a pound.

OLD METALS.

Market has been very dull and Europe is not an active buyer just now.—J. J. A.

FEBRUARY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	16.50	14.75	15.50
Electrolytic	16.25	14.70	15.30
Casting	16.25	14.60	15.25
TIN	49.65	47.70	48.75
LEAD	4.35	4.35	4.35
SPELTER	6.85	6.25	6.50
ANTIMONY (Hallett's)	9.00	9.00	9.00
SILVER	62⅝	58⅞	61.64

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	March 8, 1913.
Stocks of marketable copper of all kinds on hand at all points in the United States, February 1, 1913.	123,198,332
Production of marketable copper in the United States from all domestic and foreign sources during February, 1913	130,948,881
	254,147,213
Deliveries:	
For domestic consumption 59,676,492	
For export 72,168,523	
	131,845,015
Stocks of marketable copper of all kinds on hand at all points in the United States, March 1, 1913..	122,302,198
Stocks decreased during the month of February....	896,134

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1912—Average for year, 16.70. 1913—January, 17; February, 15.50.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

Metal Prices, March 10, 1913

METAL PRICES.	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free. Manufactured 2½c. per lb.	
Lake, carload lots	15.00
Electrolytic, carload lots	15.00
Casting, carload lots	14.75
TIN—Duty Free.	
Straits of Malacca, carload lots	47.50
LEAD—Duty Pig, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, cahload lots	4.35
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	6.25
ALUMINUM.—Duty Crude, 7c. per lb. Plates, sheets bars and rods, 11c. per lb.	
Small lots, f. o. b. factory	25.20
100 lb. lots, f. o. b. factory	23.20
Ton lots, f. o. b. factory	22.20
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	9.25
Hallett's cask lots	9.00
Hungarian grade	8.00
NICKEL—Duty Ingot, 6c. per lb. Sheet, strip and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.40 to .45
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 20 per cent.	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	2.00
BISMUTH—Duty free	2.10
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad valorem	.98
QUICKSILVER—Duty 7c. per lb	.56
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	46.00
SILVER—Government Assay Bars—Duty free	.60⅞

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10%.....according to quantity	27 to 32
Silicon Copper, 20%..... " "	34 to 36
Silicon Copper, 30% guaranteed " "	36 to 38
Phosphor Copper, guaranteed 10% ..... " "	25 to 28
Phosphor Copper, guaranteed 15% ..... " "	24 to 28
Manganese Copper, 25%..... " "	27 to 30
Phosphor Tin, guaranteed 5%.. " "	60 to 63
Phosphor Tin, no guarantee.... " "	53 to 55
Brass Ingot, Yellow..... " "	10⅜ to 11
Brass Ingot, Red ..... " "	13 to 15
Bronze Ingot ..... " "	14⅛ to 14½
Manganese Bronze ..... " "	18½ to 20
Phosphor Bronze ..... " "	13 to 16
Casting Aluminum Alloys..... " "	25 to 27

PHOSPHORUS—Duty 18c. per lb.	
According to quantity	30 to 35

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
13.50 to 13.75	Heavy Cut Copper	14.25 to 14.75
13.00 to 13.25	Copper Wire	14.00 to 14.25
11.75 to 12.00	Light Copper	12.75 to 13.00
11.75 to 12.00	Heavy Mach. Comp	12.75 to 13.00
8.00 to 8.25	Heavy Brass	9.00 to 9.25
6.75 to 7.00	Light Brass	7.75 to 8.00
7.75 to 8.00	No. 1 Yellow Brass Turnings	8.25 to 8.50
10.50 to 11.00	No. 1 Comp. Turnings	11.50 to 12.00
3.75 to ——	Heavy Lead	—— to 4.00
5.50 to ——	Zinc Scrap	—— to 6.00
10.00 to 12.00	Scrap Aluminum, turnings	12.00 to 14.00
15.00 to 19.00	Scrap Aluminum, cast, alloyed	17.00 to 20.00
20.00 to 22.00	Scrap Aluminum, sheet (new)	21.00 to 22.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

PRICES OF SHEET COPPER.

BASE PRICE, 21 Cents per Lb. Net.

Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 ins.	"	"	½	1	2	3	5	7	—
	Longer than 120 ins.	"	"	1	1½					—
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			—
	Longer than 120 inches.	"	1	2	3					—
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	—
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			—
	Longer than 120 inches.	"	1	3	6					—
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	—
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			—
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					—
	Longer than 120 inches.	1	2	4	8					—
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					—
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					—
	Longer than 120 inches.	1	3	8						—
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						—
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						—
	Longer than 120 inches.	3	5	9						—
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 ins.	4	6							—

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for **Circles and Segments** to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC—Duty, sheet, 1⅝c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	8.25 less 8%
Casks, jobbers' prices	9
Open casks, jobbers' prices	9½

Metal Prices, March 10, 1913

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect March 10, 1913, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15⅛	$0.16⅞	$0.18
Wire	.14⅞	.16⅞	.18
Rod	.14⅞	.17⅛	.19
Brazed tubing	.19½	—	.22¾
Open seam tubing	.18¾	—	.20¾
Angles and channels, plain	.18¾	—	.21¼

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass....	½c.	per lb.	net	advance
" —Best spring, drawing and spinning brass....	1½c.	"	"	"
Wire —Extra spring and brazing wire.....	½c.	"	"	"
" —Best spring and brazing wire.....	1c.	"	"	"

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16⅜	$0.18⅛	$0.19¼
Wire	.16⅛	.18⅛	.19⅛
Rod	.16⅛	.18⅜	.20⅛
Brazed tubing	.20¾	—	.24
Open seam tubing	.19⅝	—	.22
Angles and channels, plain	.20	—	.22½

Net extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass....	½c.	per lb.	net	advance
" —Best spring, drawing and spinning brass....	1½c.	"	"	"
Wire —Extra spring and brazing wire.....	½c.	"	"	"
" —Best spring and brazing wire.....	1c.	"	"	"

BARE COPPER WIRE—CARLOAD LOTS.

16½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	21½c.	per lb.	base
100 lbs. to 300 lbs. in one order	22c.	"	"
Less than 100 lbs. in one order	23½c.	"	"

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet— Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50 and 5%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	17½c.	net	base
Munts or Yellow Metal Sheathing (14" x 48")	15½c.	"	"
" " " Rectangular sheets other than Sheathing	18c.	"	"
" " " Rod	15½c.	"	"

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 24½c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 28 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width, Inches.	1 ton.	500 lbs.	50 lbs.	Less than 50 lbs.
20 and heavier	3-30	33c.	34c.	36c.	38c.
	3-30	34c.	35c.	37c.	39c.
21 to 24 inclusive	30-48	36c.	37c.	39c.	41c.
	48-60	39c.	40c.	42c.	44c.
25 and 26	3-30	35c.	36c.	38c.	40c.
	30-48	37c.	38c.	40c.	42c.
27	3-30	36c.	37c.	39c.	41c.
	30-48	39c.	40c.	42c.	44c.
28	3-30	37c.	38c.	40c.	42c.
	30-48	40c.	41c.	43c.	45c.
29	3-30	38c.	39c.	41c.	43c.
	30-48	42c.	43c.	45c.	47c.
30	3-30	39c.	40c.	42c.	44c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. Charges made for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters. BASE PRICE, 24 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	19	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter, B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb....	33	33½	33½	34	34½	35	35½	36	37	38	39	44	47

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to	No. 19,	B. & S.	Gauge,	inclusive	$0.60
6	"	" 19,	"	"	"	.70
9	"	" 19,	"	"	"	.85
12	"	" 19,	"	"	"	1.00
15	"	" 19,	"	"	"	1.15
16	"	" 19,	"	"	"	1.20
18	"	" 19,	"	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.